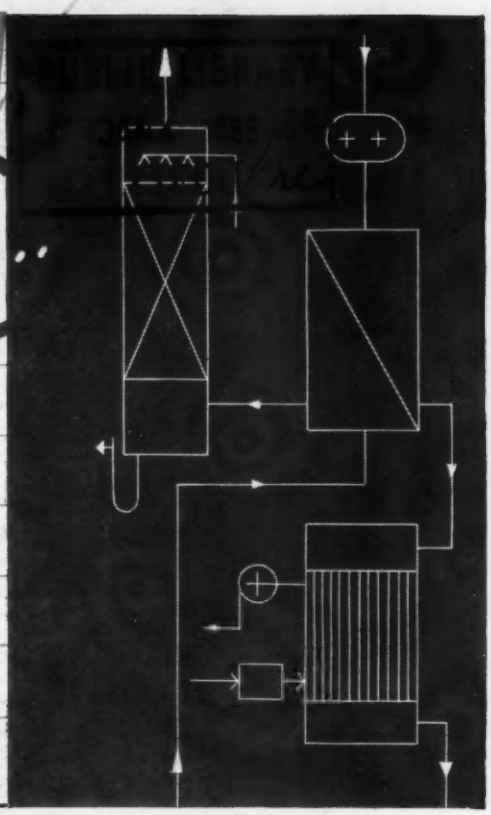
TECHNOLOGY DEPT.

Gas Journal

VOL. 280 106TH YEAR. LONDON, DECEMBER 15, 1954 NO. 4776. PRICE 1/3

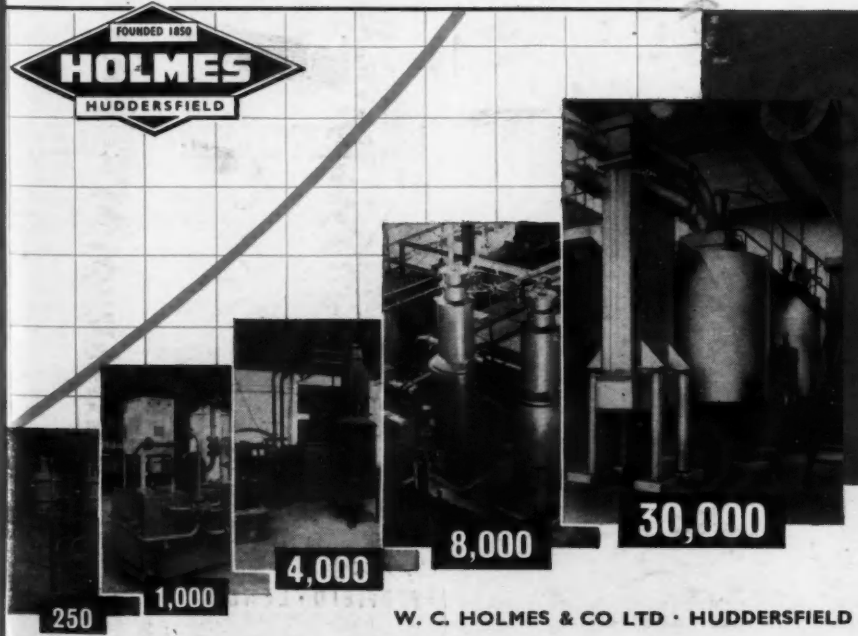
250 shows 250,000 the way...

Since 1942 Catalytic Sulphur Removal Plants in use at works of Industrial Consumers have given service to many of the Gas Industry's clients, for exacting duties. In this way there have been provided the experience and data essential for the design of such plants on the gas works scale.



SULPHUR REMOVAL PLANT

FOUNDED 1850 HOLMES HUDDERSFIELD



and NOW

250,000

CU. FT. PER HOUR

W. C. HOLMES & CO LTD · HUDDERSFIELD · LONDON · BIRMINGHAM

There's 4 MILLION FEET OF PROOF that FRANCOIS BORED PILES GIVE GREATER STRENGTH & STABILITY to foundations of every type.

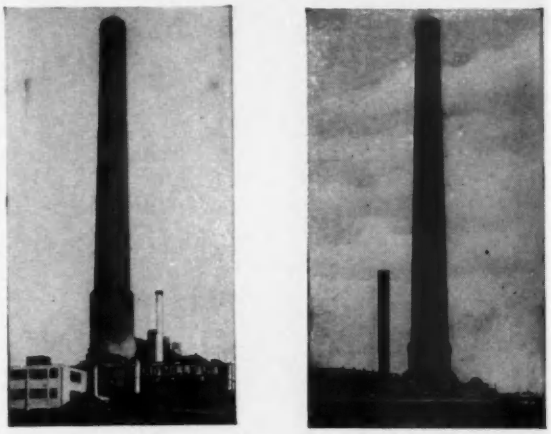
From the investigation of the site to the completion of the job, the Cementation Co. Ltd. provide a complete world-wide service on foundations and underpinning, which is unrivalled for experience, facilities and resources.

Time has proved, over and over again that concrete piles and cementation methods not only give the greatest strength and stability to many types of foundation, but are often the only solution in certain difficult conditions.

In addition there is no harmful vibration, distortion or excessive noise during construction.

The successful completion of over 4 million feet of Bored Piling during the last fifteen years is an achievement which speaks for itself.

Left : Trial borings for reconstruction of Coventry Cathedral.



Two of the largest chimneys in the British Isles; on foundations of Francois Concrete Piles (left) and Francois Cementation Piles (Right)

Write for your copy of our new booklet about Bored Piling.

The CEMENTATION COMPANY LIMITED

London Office : 39, Victoria St., S.W.1. Tel. ABBey 5726

BENTLEY WORKS, DONCASTER Telephone 54177-8-9

NORWEST IS EVERYWHERE

Geology is our stock-in-trade, but we have not neglected our geography! With headquarters in Liverpool, our widespread organisation is controlled from the central point of the British Isles. We are thus in the happy position of being able to serve all parts with maximum speed and efficiency. The mains-laying programme which we handle for many industries, unsurpassed in total mileage, is a very practical commentary on this vital factor. Are you taking advantage of "NORWEST" resources? Let us quote for your next contract.

NORWEST THE MAIN LAYING PEOPLE

NORWEST CONSTRUCTION COMPANY LIMITED, LIVERPOOL 21. CIVIL ENGINEERING CONTRACTORS

CVS - 12

A

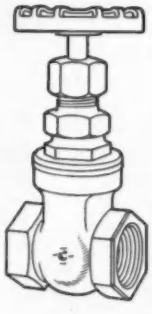
CRANE REVIEW No. 1.

Tom thumb valve does man-sized job!

Though this ⅛" Crane needle valve fits easily in the palm of a man's hand, it is a giant when it comes to work ! It provides regulation for water, oil or gas pressure up to 400 pounds.* Crane valves range from these midgets to 16" monsters, thousands of which have had a big role in Britain's great post-war oil refinery development. All Crane valves and fittings, whatever their size or type, are rigorously tested at every stage of manufacture and only raw materials that satisfy the most exacting standards are used.

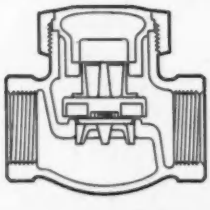
**Indicated maximum working pressures are always conservative and may be accepted with confidence.*

D.159 GUN METAL GATE VALVE
Wedge disc, non-rising stem. Screwed ends with British or American threads. Working pressures, saturated steam up to 150 pounds; water (non-shock) up to 300 pounds. ¼" to 3". Also available with flanged connections.



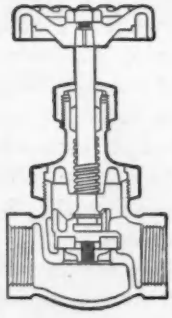
No. 151 MALLEABLE IRON BANDED ELBOW
Sizes (equal and reducing) ⅛" to 6", black or galvanised. Screwed British or American taper threads. Individually tested.

D.116 GUN METAL CHECK VALVE
Renewable disc, Union cap. Screwed ends with British or American threads. Working pressures, saturated steam up to 200 pounds; cold services such as water, oil, gas or air (non-shock) up to 400 pounds. Sizes ¼" to 3". (Sizes 2½" and 3" have bolted caps.)



No. 199 MALLEABLE IRON BANDED PITCHER TEE
Sizes (equal and reducing) ¼" to 6", black or galvanised. Screwed British or American taper threads. Individually tested.

D.7 GUN METAL GLOBE VALVE
Renewable disc, Union bonnet. Screwed ends with British or American threads. Working pressures, saturated steam up to 200 pounds; cold services such as water, oil, gas or air (non-shock) up to 400 pounds. Sizes ¼" to 3". Also available with flanged connections. (Sizes 2½" and 3" have bolted bonnets.)



CRANE VALVES AND FITTINGS FOR STEAM, WATER, OIL AND AIR

C.I.

CRANE LTD., 45-51 LEMAN STREET, LONDON, E.1. Works: IPSWICH. *Branches: Birmingham, Brentford, Bristol, Glasgow, Manchester*

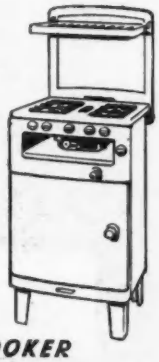
A TOAST
to festive cooking...

Seasonal Greetings
from

STOVES LTD

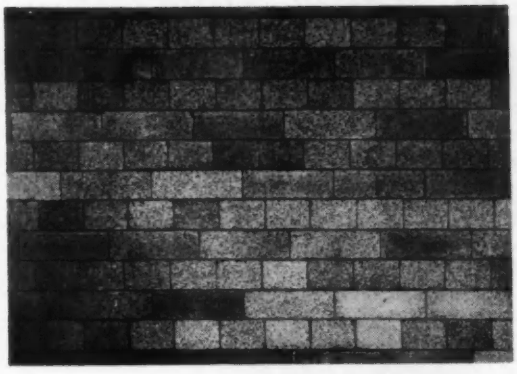
RAINHILL · LIVERPOOL

LONDON OFFICE: 91 FARRINGDON ROAD, E.C.1.



You get the best out of a NEWHOME MODERN GAS COOKER

STEIN *Refractories*

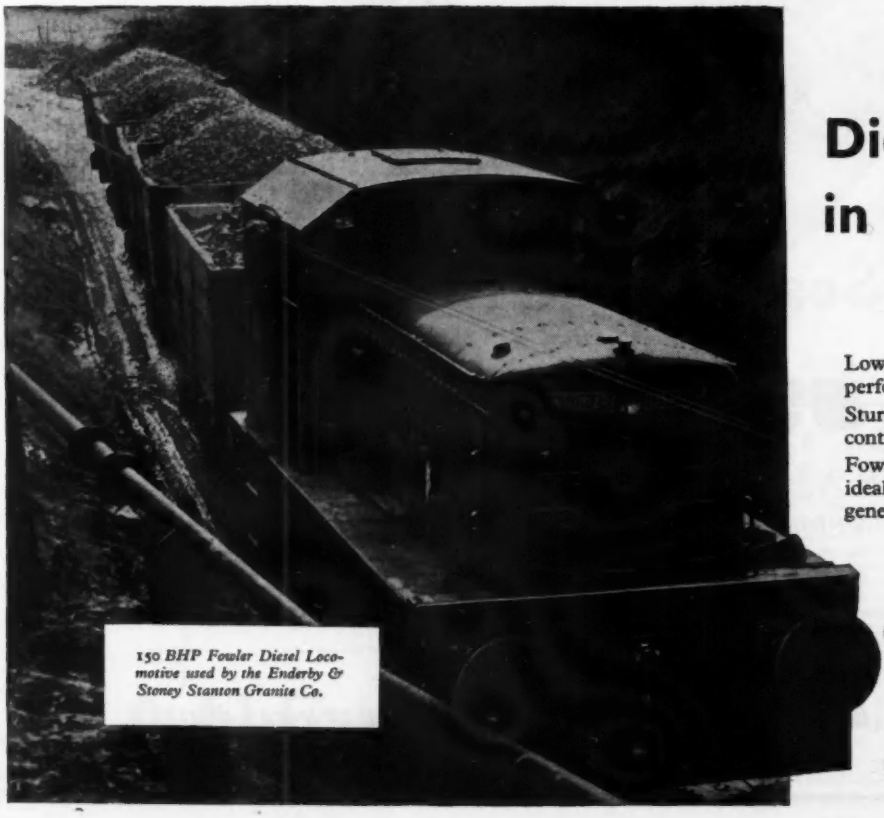


THE STRENGTH OF FURNACE BRICKWORK—and durability of the furnace lining in service is greatly controlled by the joints. Well shaped bricks of accurate size, use of a Refractory Cement correctly chosen for the purpose, combined with good bricklaying (which means thin, tight joints) gets a furnace lining off to a good start. A Refractory Cement should be selected just as carefully as the brick with which it is to be used. We are always very willing to give our advice on the best type of Cement for particular applications.

MAKSICCAR FIRE CEMENT · MAKSICCAR II · NETTLE CEMENT · STEIN SILLIMANITE CEMENT · STEIN HIGH ALUMINA CEMENT · STEIN CHROME CEMENT · STEIN CHROME-MAGNESITE CEMENT · STEIN MAGNESITE CEMENT · BLUEBELL SILICA CEMENT · THISTLE AND STEIN FIRECLAYS · GROUND GANISTER

JOHN G. STEIN & Co. LTD Bonnybridge, Scotland

TEL: BANKNOCK 255 (3 LINES)



150 BHP Fowler Diesel Locomotive used by the Enderby & Stoney Stanton Granite Co.

Fowler Diesel Power in the quarry industry

Low fuel consumption and high performance for *economy*.

Sturdy construction and simple controls for *reliability*.

Fowler Diesel Locomotives are ideal for all industrial purposes, general or specialised.

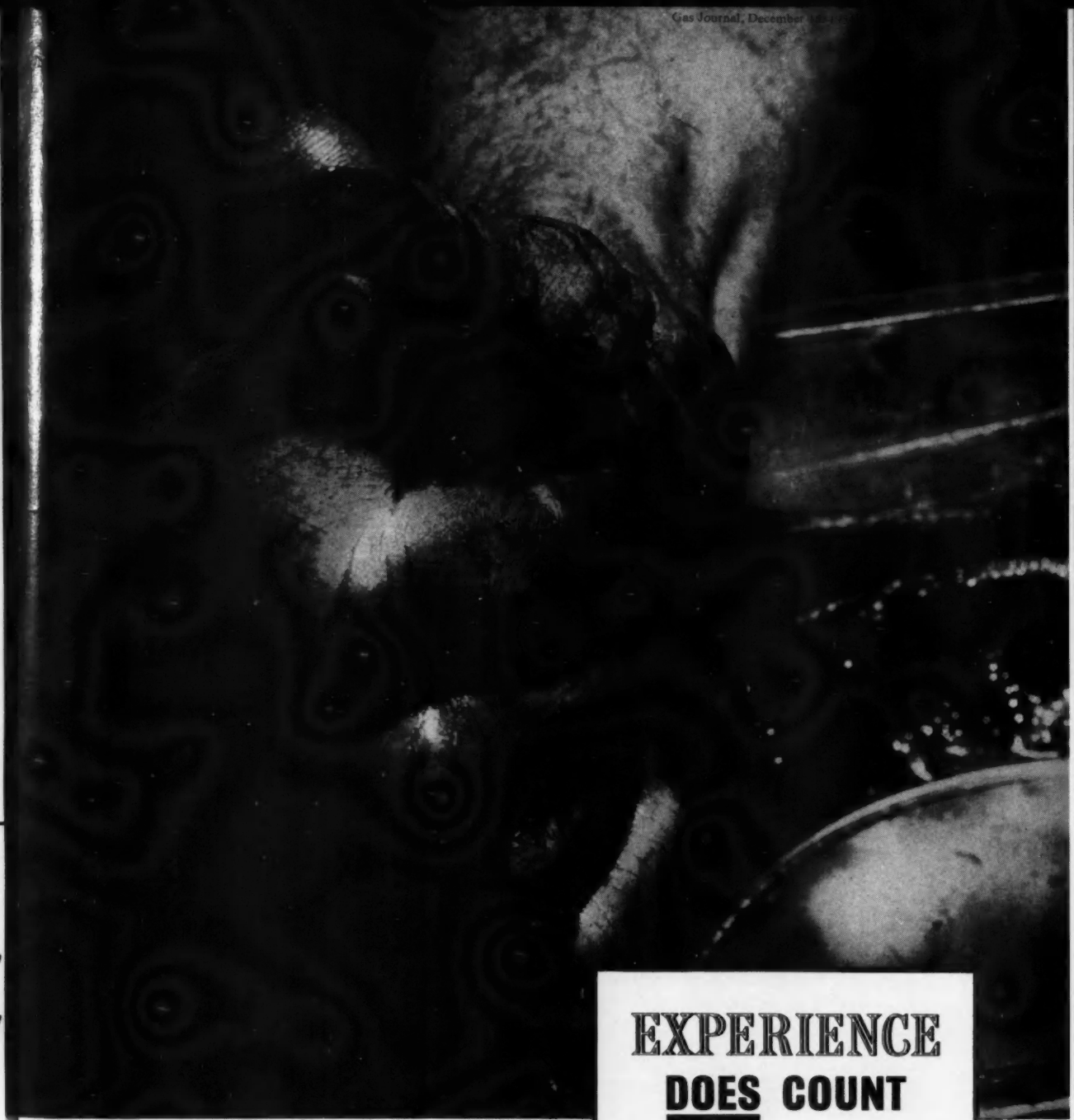
Write for leaflets and general details to

John Fowler & Co. (Leeds) Ltd., Leeds 10

Telephone: Leeds 30731 (10 lines)

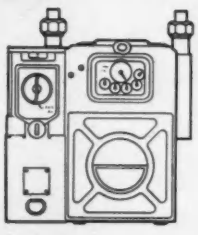
FOWLER

Products of the Marshall Organisation Gainsborough, England.



WILLEY

EXPERIENCE
DOES COUNT



In the production of meters, as in that of all Willey equipment, precision is the key-note. From the selection of materials to the final testing, high standards are set for man and machine alike.

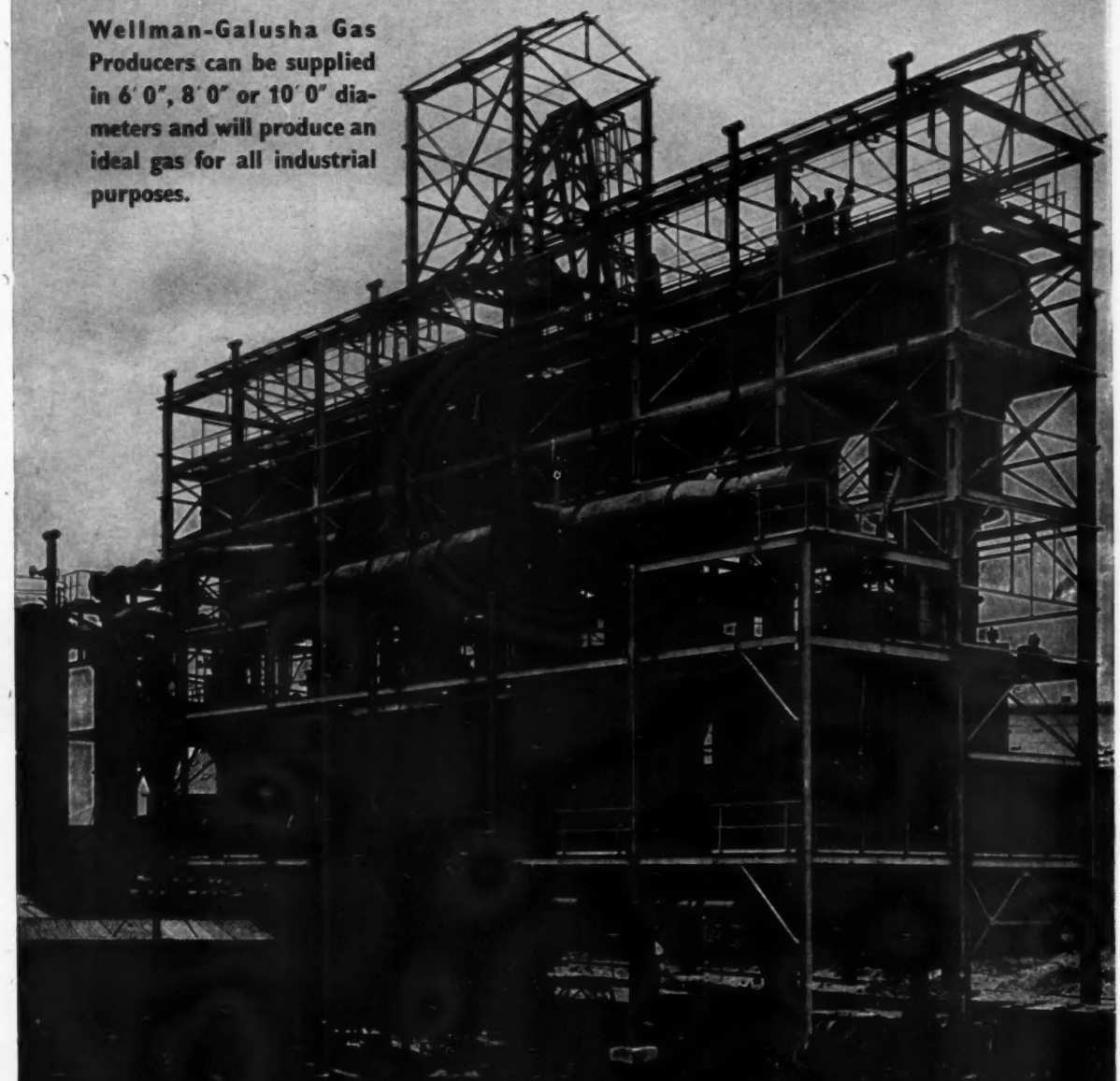
WILLEY & CO. LTD. EXETER · LONDON · MANCHESTER · LEICESTER · DARLINGTON

Associated Company of United Gas Industries Ltd.

Wellman-Galusha Gas Producers

A battery of seven 10′ 0″ diameter Wellman-Galusha Gas Producers, for gasifying Natal anthracite coal—under construction at Vereeniging, Transvaal, South Africa. The entire installation is one of the most extensive gas producer plants to be erected initially as one battery in the British Commonwealth.

Wellman-Galusha Gas Producers can be supplied in 6′ 0″, 8′ 0″ or 10′ 0″ diameters and will produce an ideal gas for all industrial purposes.



THE WELLMAN SMITH OWEN ENGINEERING CORPN. LTD.
PARNELI HOUSE, WILTON ROAD, LONDON, S.W.1 WORKS: DARLASTON, SOUTH STAFFS.

Photograph by Gas Council

Osram

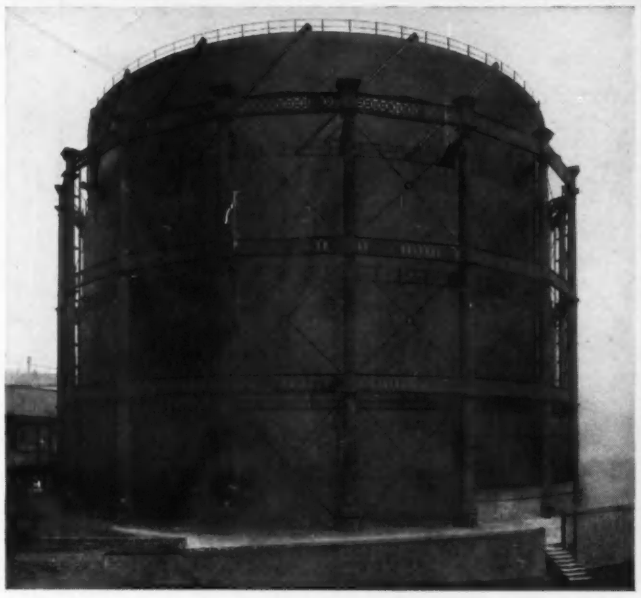
LAMPS AND TUBES

Just as gas plays an important part in the manufacture of Osram lamps, so can Osram tungsten lamps and fluorescent tubes make a valuable contribution to the gas industry wherever electric light is used. Osram lamps and tubes are made by the G.E.C.—the largest British electrical manufacturing organisation—with all the skill, knowledge and experience so closely associated with this great firm.

for THE GAS INDUSTRY

A G.E.C. PRODUCT. THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

GASHOLDERS by



HIGH PRESSURE, SPIRAL and COLUMN GUIDED

CONDENSERS
WASHERS
SCRUBBERS
PURIFIERS
C.V. CONTROLLERS
STEEL PIPES AND MAINS

FIRTH BLAKELEY SONS & CO LTD

CHURCH FENTON, YORKS

Telephone: BARKSTON ASH 234/5

2000 hammer blows a minute from your electric drill!

Turn an ordinary electric drill into a sturdy hard-working power hammer, simply by slipping a Rawlplug Drill-Hammer into the chuck! This ingenious device converts rotary motion into percussion—one blow per rev. of the drill; with it you can bore concrete, etc. (up to ¾" holes) at really surprising speeds. Weight of blows adjustable to 'light', 'medium' or 'heavy'.

The Rawlplug Drill-Hammer is light and easy to use, yet has ample strength for long service and the severe treatment of practical conditions. An automatic clutch ensures that percussion takes place only when the tool is pressed against the masonry.

This tool will save you a lot of time and money—

Brief specification: *The best operating speed is between 1500-2000 r.p.m. and the Electric Drill should have a minimum ½" chuck. Capacity: Rawlplug Hammer Drill No. 3H (¼" diameter) to No. 20H (¾" diameter). Weight 2¾ lb.*

RAWLPLUG WALL PLUGS DRILL HAMMER

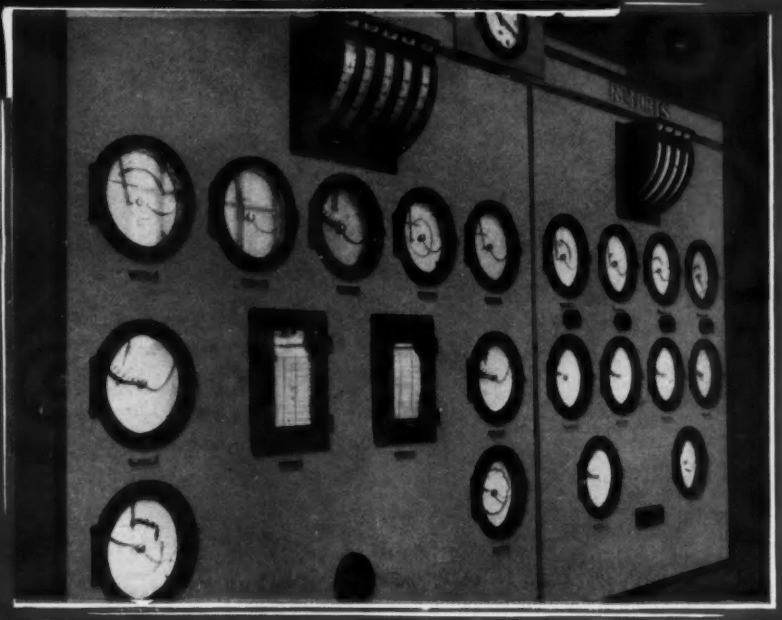
Write now for illustrated folder containing full technical details.

THE RAWLPLUG COMPANY LIMITED · LONDON · S.W.7

ELECTROFLO

Instrumentation

Instrument panel for retorts and waste heat boilers installed by the Electroflo Erection Department and commissioned by Gas-Industry-trained Service Engineers.



at the

New DUMBARTON Works

SCOTTISH GAS BOARD

To the order of West's Gas Improvement Company Limited

ELECTROFLO METERS COMPANY, LTD.

Head Office: Abbey Road, Park Royal, London, N.W.10.
Factories: Park Royal, London and Maryport, Cumberland.
Telephone: ELGar 7641 Telegrams and Cables: Elflometa, Harles, London.

A Manufacturing Organisation devoted to the DESIGN, PRODUCTION, INSTALLATION & SERVICING of industrial instrumentation and automatic control of all types of power and processing plants.

Write for Cat. 40 "Instruments for the Gas Industries".

The "Windsor" Convector

is now established first in the field of general purpose gas space heaters. Classic design, sturdy construction, attractive all gold finish, plus high efficiency justify its selection by a discriminating Public.

SUGG WESTMINSTER

WILLIAM SUGG & CO. LTD

(Inc. Cowper Penfold & Co. Ltd.)

VINCENT WORKS, REGENCY ST., LONDON, S.W.1. Tel.: VIC 3211

CERTIFIED PERFORMANCE

Pipe Line Progress...

The strength and comparative lightness of the large diameter steel pipe coupled with its sectional length of twenty-five feet means faster laying, fewer joints and no breakage risks—practical and economical progress. Other equally important features of these pipes are illustrated in our Catalogue S.P. 40.

The **HORSELEY** *Group*

HORSELEY BRIDGE AND THOMAS PIGGOTT LTD., TIPTON, STAFFS.
CARTER-HORSELEY (ENGINEERS) LTD., WADDON, CROYDON, SURREY
AND ASSOCIATED COMPANIES.

HIGH GRADE SLOT AND ORDINARY METERS

I.G.E. AND HIGH CAPACITY LISTS

Nothing but the best materials and workmanship used in their manufacture

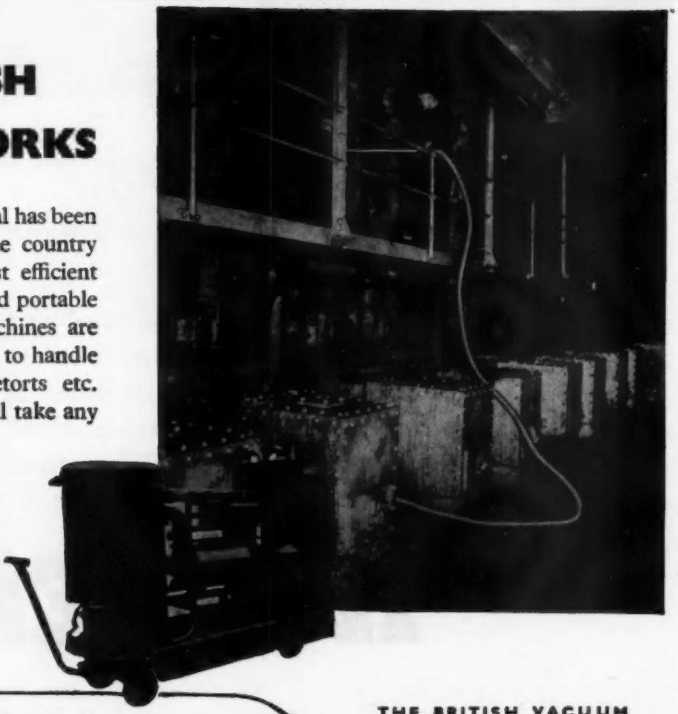
R. LAIDLAW & SON (Edin.) Ltd.
SIMON SQUARE WORKS, EDINBURGH
8/9, LUDGATE SQUARE, LONDON, E.C.4

Repairs—Parts Supplied

HOT DUST AND ASH REMOVAL IN GAS WORKS

THE B.V.C. system of vacuum dust removal has been established in gas works throughout the country and is now generally recognised as the most efficient system for the purpose; both central plants and portable machines are available. Where portable machines are used a water cooler container allows the plant to handle the hot dust and ash from the top of retorts etc. and specially designed non-choking tools will take any volume of dust.

The illustration shows Redditch Gas works where a portable B.V.C. machine operates through an installed pipe system. Full particulars of these and other installations on request.

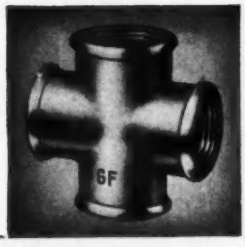


B.V.C
BRITISH VACUUM CLEANER
INDUSTRIAL VACUUM CLEANERS

THE BRITISH VACUUM CLEANER & ENGINEERING CO. LTD.
Dept. 42/BH Goblin Works, Leatherhead, Surrey
Tel.: ASHtead 866

Men who strive for perfection *specify* GF *malleable iron pipe fittings*

They represent the flower of modern metallurgical and precision engineering practice, the outcome of nearly a century of scientific research and practical experience! Manufactured from the best British Whiteheart Iron and annealed by exclusive **GF** methods, **GF** Pipe Fittings are available in one grade only, suitable for Steam, Water, Gas, Oil or Air services. They are non-porous, are screwed in perfect alignment and are beaded to give maximum strength. **GF** Fittings are supplied in two finishes: black (with a special **GF** varnish) or hot galvanised. Each and every fitting is subjected to an individual test of 360 lb. per sq. in. before despatch.



THE BUILDING CENTRE
26 STORE STREET W.C.1

LE BAS TUBE COMPANY LIMITED · CITY WALL HOUSE · 129 FINSBURY PAVEMENT · LONDON, E.C.2
Warehouses: LONDON · MANCHESTER · GLASGOW · BELFAST
British made at: Britannia Works, Bedford

I.C.I. Copper tubes for trouble-free Gas Systems

For domestic gas systems, light gauge copper tubes made by the Metals Division of I.C.I. have five obvious advantages. They are:—

1 **Economical, both in laying costs and maintenance.**

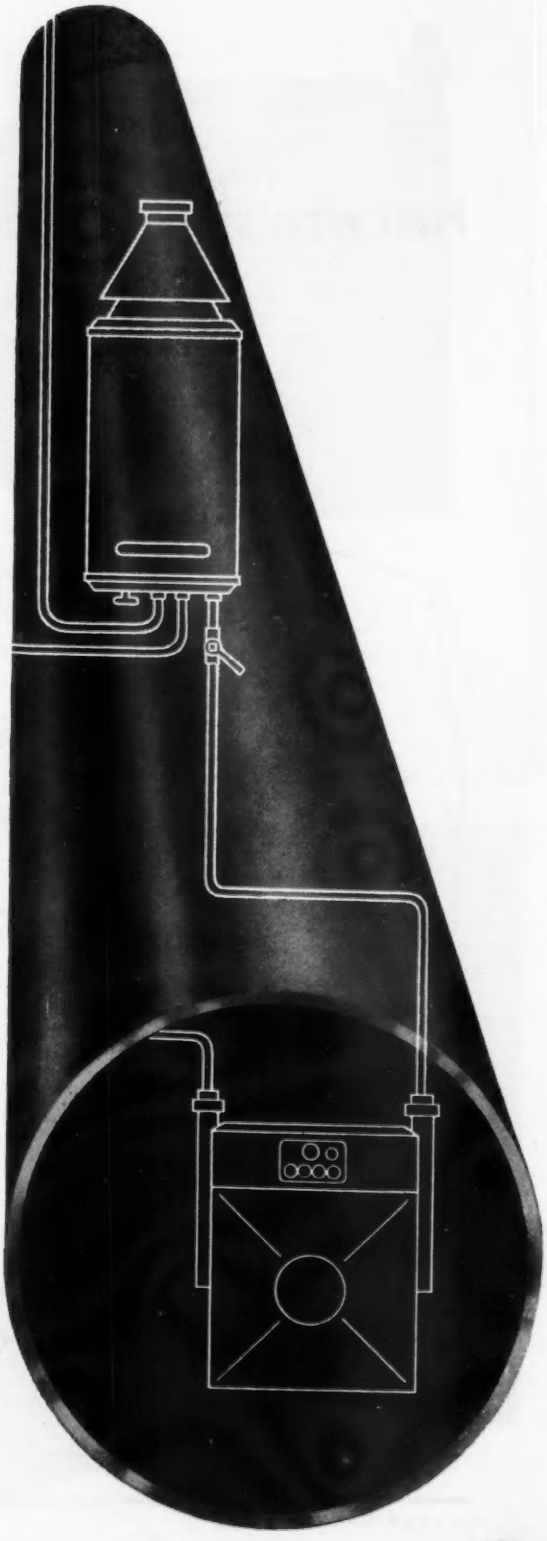
2 **Not attacked by normal town gas.**

3 **Easily manipulated and installed.**

4 **Strong in relation to their light weight.**

5 **Neat in appearance.**

Whatever the building—farmhouse or factory; house, hotel or hospital—the job is better done with I.C.I. copper tubes.

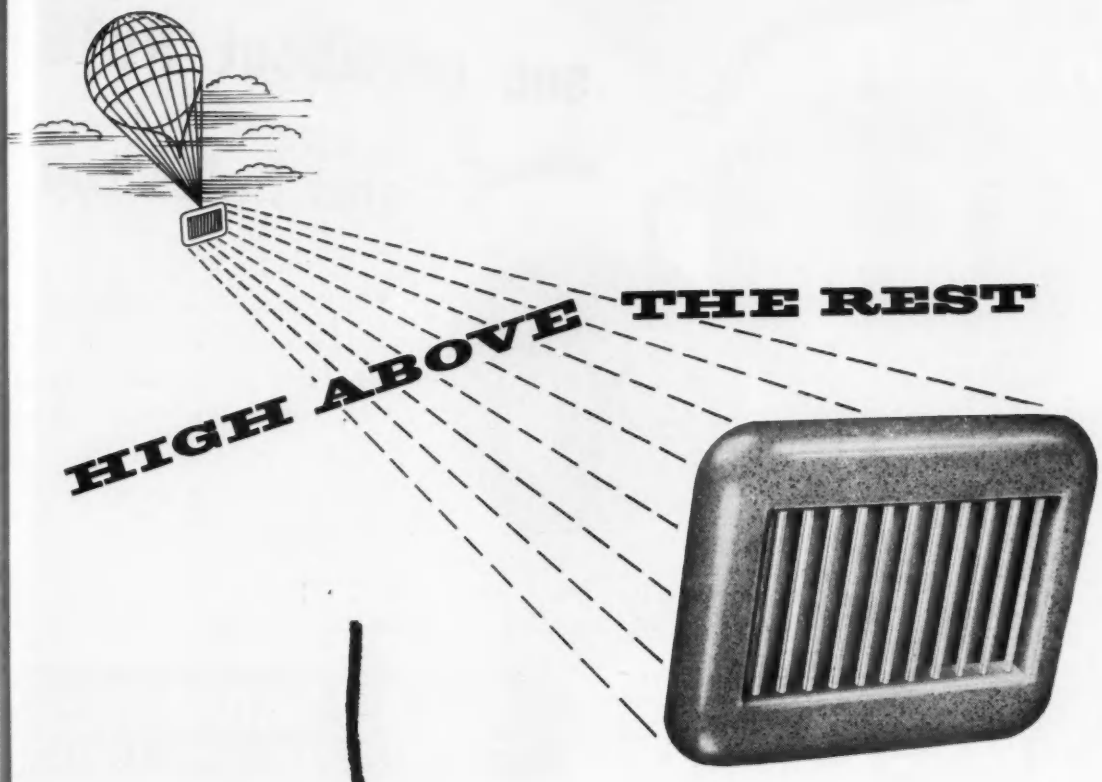


IMPERIAL CHEMICAL INDUSTRIES LTD LONDON SW1

Fittings for copper tubes are made by Fyffe & Co. Ltd., Dundee, a subsidiary company of I.C.I.

ICI

M.184



HIGH ABOVE THE REST

THERE'S NO DOUBT ABOUT IT — the "Mastertherm" is a winner! Latest in the RADIANT-HEATING range, astonishing demand has already proved its undoubted success. Fitted with patent, flameless burners, the "Mastertherm" can be tilted to any angle between 30° and 75°. It is thus equally efficient whether installed at high or low levels. Radiant, healthy heat—like heat from the sun—is directed downwards and outwards, ensuring an exceptionally wide area of distribution. This heater is particularly suitable for lofty buildings, such as factories and churches, and is designed for use on low pressure town gas or liquid petroleum gases. Available in two sizes for wall or suspension fitting, the "Mastertherm" is the *cheapest system of heating you can install.*

Remember — the "Mastertherm" is made by RADIANT-HEATING, makers of the "Floortherm", "Supertherm" and "Golden Glow" . . . and a host of other superior gas appliances. For this reason alone, you can recommend the "Mastertherm". It is the finest overhead space heater in the world.

Send for detailed dimension drawings and full particulars of the "Mastertherm"

We've a name for efficient Gas Heating

it's **RADIANT-HEATING LTD**

RADIANT WORKS · BARNSBURY PARK · LONDON · N.1 *Tel: NORTH 1677 (3 lines)*

see us about NUTS!

and bolts too!

You don't need to look very hard for a reliable supplier of bolts and nuts—Lanarkshire can fill most needs and keep good delivery dates. Try the service for yourself; write now for fully descriptive literature on our products.

Black, bright, non-ferrous bolts and nuts and high tensile bolts, too, by:

Our "Monthly Stock List" keeps buyers right up to date with the supply position. If you are not receiving your copy please ask to be put on the mailing list.

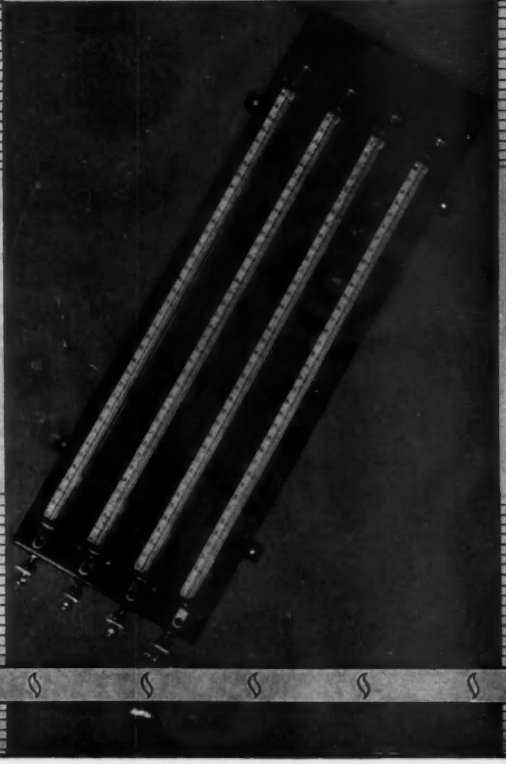
the LANARKSHIRE
BOLT & RIVET COMPANY LIMITED

Burnbank, Lanarkshire, Scotland. Tel.: Hamilton 1241-4

MOUNTED ON EBONY SINDANYO BOARD

SINGLE TUBE PRESSURE GAUGES

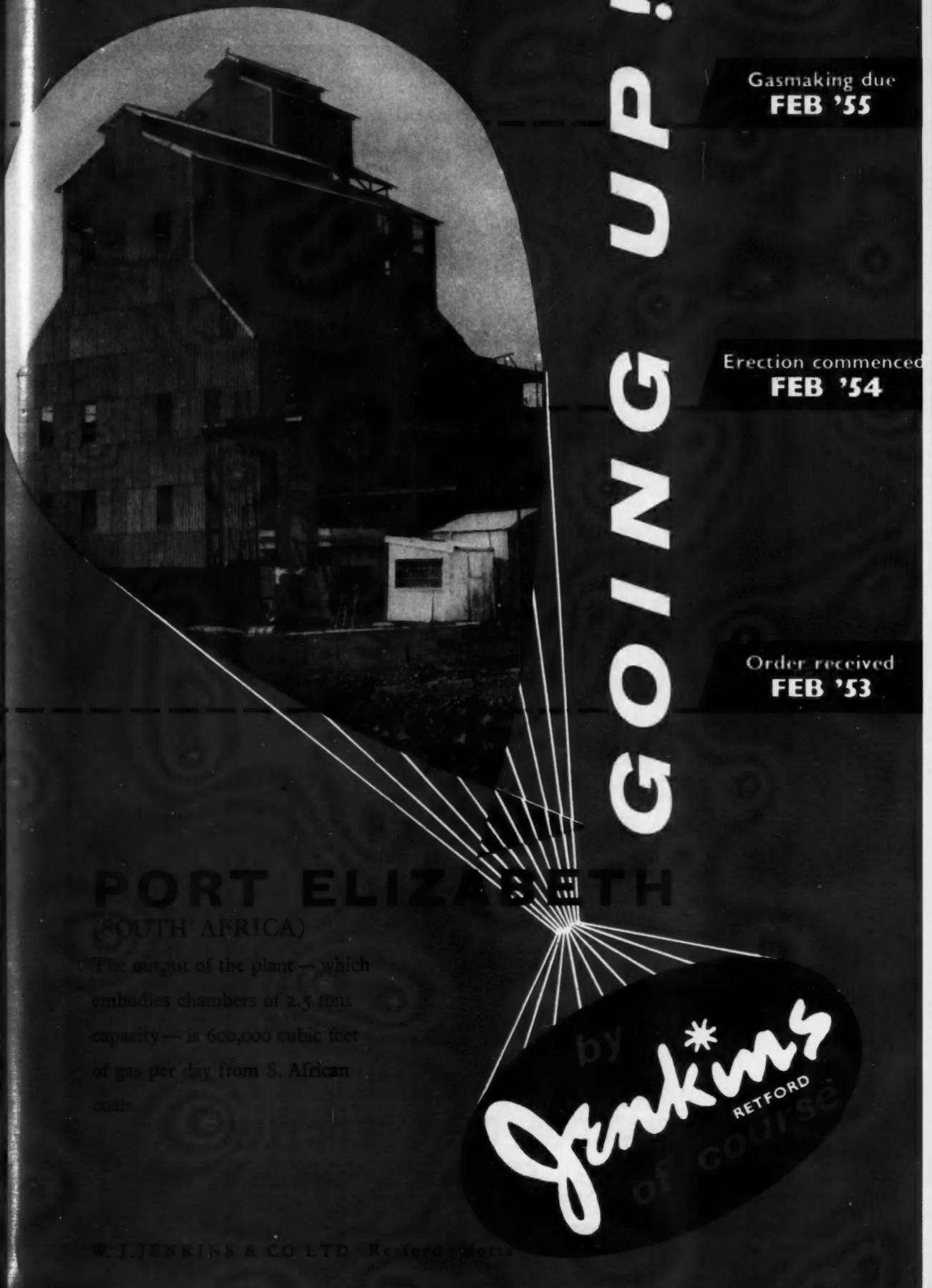
INSTRUMENTS OF PRECISION

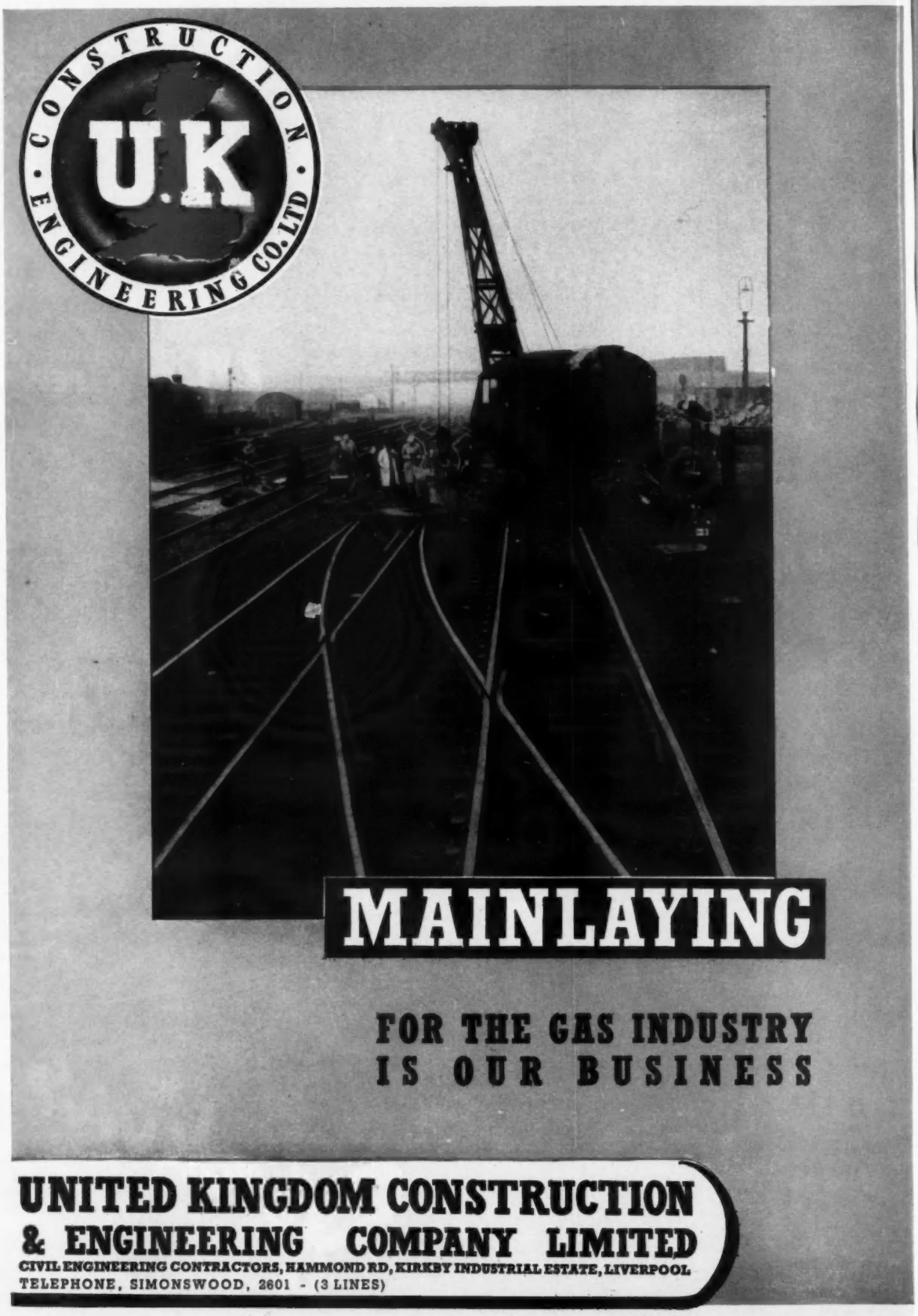


MOUNTED ON EBONY SINDANYO

MILNE'S METERS LTD
MILTON HOUSE WORKS
EDINBURGH

LEEDS BRANCH
MIDLAND METER WORKS VICTORIA ROAD


GOING UP!
Gasmaking due
FEB '55
Erection commenced
FEB '54
Order received
FEB '53
PORT ELIZABETH
(SOUTH AFRICA)
The output of the plant — which embodies chambers of 2.5 tons capacity — is 600,000 cubic feet of gas per day from S. African coals.
by
Jenkins
RETFORD
of course
W. J. JENKINS & CO. LTD. Retford, Notts.


U.K
CONSTRUCTION
ENGINEERING CO. LTD.
MAINLAYING
FOR THE GAS INDUSTRY
IS OUR BUSINESS
UNITED KINGDOM CONSTRUCTION
& ENGINEERING COMPANY LIMITED
CIVIL ENGINEERING CONTRACTORS, HAMMOND RD, KIRKBY INDUSTRIAL ESTATE, LIVERPOOL
TELEPHONE, SIMONSWOOD, 2601 - (3 LINES)

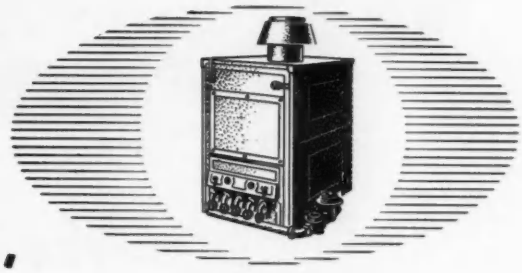
When a Teddington instrument is in control...

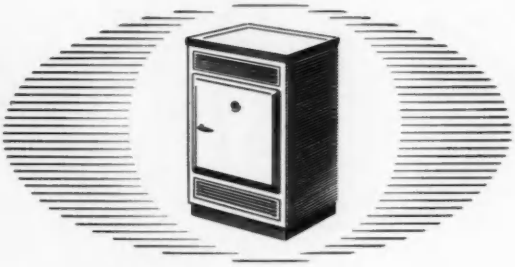
cookers cook...

.heaters heat...

.and fridges freeze...

.at exactly the right temperature!





Modern Teddington gas controls make life easier for a lot of people—from appliance manufacturers to housewives and boilermen. For a Teddington thermostat keeps a rigid, unwavering eye on the gas during an appliance's entire useful life. That's why more and more manufacturers specify Teddington controls. Deliveries are quick. Spares are plentiful. And bulk order prices are tempting. May we quote you one?

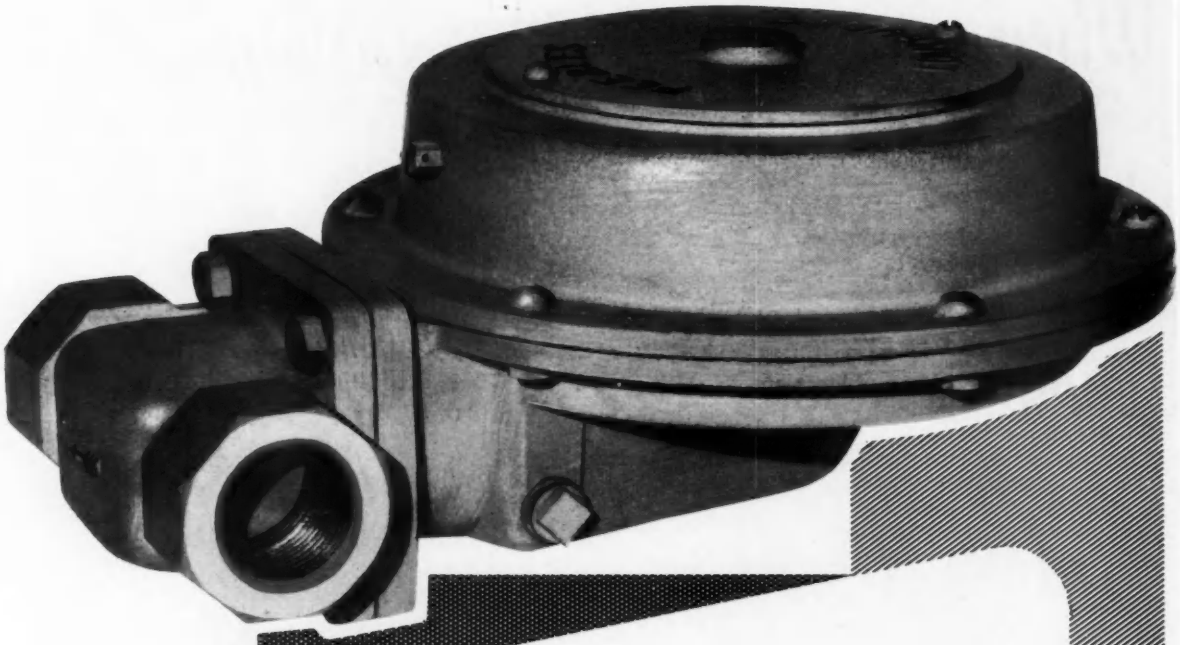
Teddington

THE BRITISH THERMOSTAT COMPANY LIMITED

The largest Manufacturers of automatic controls in Europe

Sunbury-on-Thames, Middlesex. Telephone: Sunbury-on-Thames, 456.

B



The Figure 103

HIGH PRESSURE GOVERNOR

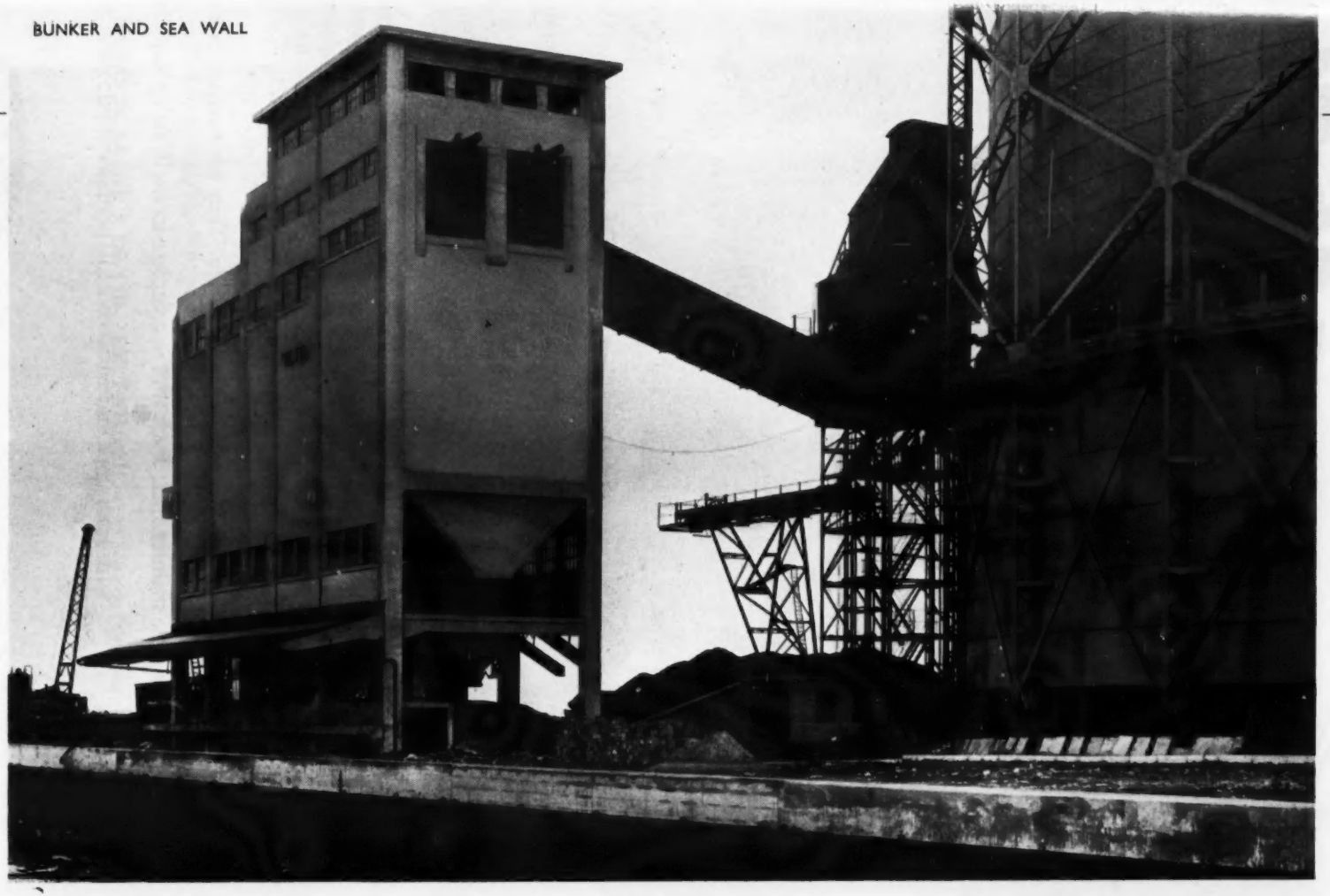
This governor may be arranged for gas flow in any direction, either horizontal or vertical, and it is suitable for inlet pressures up to 150 lbs. per square inch, with the outlet pressure in accordance with customers' requirements. Weight loading or spring loading may be employed according to pressure conditions.

Peebles
& CO. LTD.

TAY WORKS, WEST BOWLING GREEN STREET, EDINBURGH 6

Telephone : LEITH 36544 & 35069 Telegrams : "TANGENT, EDINBURGH"

BUNKER AND SEA WALL



Consulting Engineers for the Coke Bunker :
Messrs. Coignet and Partners

South Eastern Gas Board

Main Contractors for the Coke Handling Plant :
Messrs. Robt. Cort & Son, Ltd.

CROWLEY RUSSELL & CO. LTD. 131, VICTORIA STREET, LONDON,
CIVIL ENGINEERING CONTRACTORS S.W.1.
Telephone : **VIC. 7788**

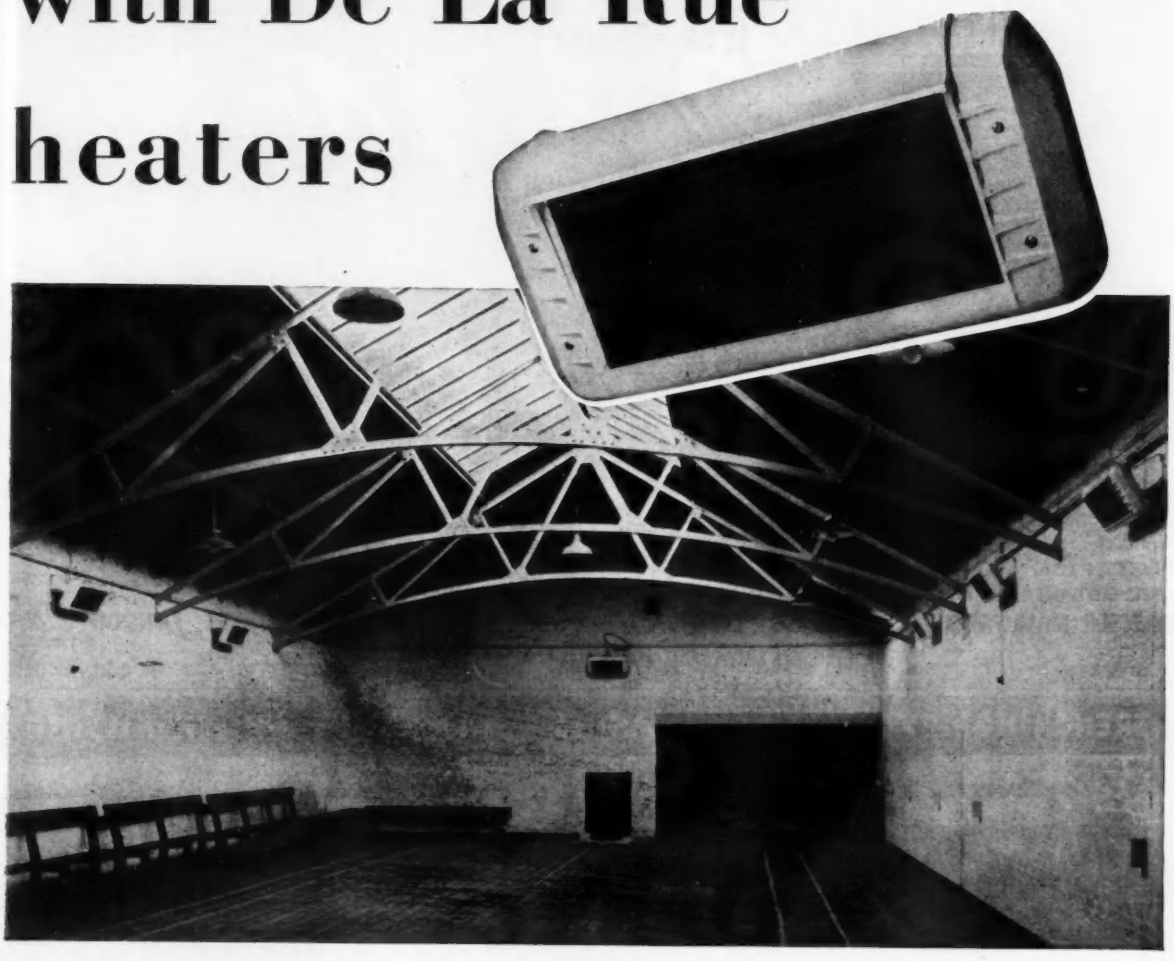
AT EASE!

infra red

Cosiness has never been a notable feature of a military exercise, but a lecture or an evening 'at home' in the drill hall is quite a different matter. Warmth and comfort are very necessary. This was the problem confronting the men of the Territorial Army, Crewkerne, Somerset. Obviously some sort of heating had to be provided in their Drill Hall for wintry evenings. The installation was to be clean, and was not to take up any floor space. The system provided had to be sufficiently flexible to be operated economically for only a few hours, three or four evenings a week, and to be unaffected by the high heat losses inherent in this type of building.

The South Western Gas Board came to the rescue. They recommended, and later installed, eight stylised De La Rue *Gas-fired* infra red heaters. Now the Drill Hall's all Sir Garnett! These panels are at work, with similar success, in many varied installations—in stores, offices, cinemas and schools, for example. They are easy to fix and require very little maintenance. Each unit is complete in itself, being supplied with lever cock and chain control, permanent pilot and gas

with De La Rue heaters



pressure governor. De La Rue Heaters are attractively styled to harmonize with all interiors and the panel surrounds are vitreous enamelled in Silver-Grey, Buff or Green mottled finish. The emitter plate is black enamel.

Industrial and safety-type models are also available; write for full details to:

THOMAS DE LA RUE & CO. LTD., (GAS DIVISION), Imperial House, 84/86 Regent Street, London W.1.

DE LA RUE INFRA RED SPACE HEATERS

keep people warm

Over a Million

DRESSER

STYLE 60 adjustable leak clamps

have been installed

BY GAS AND WATER UNDERTAKINGS THROUGHOUT THE WORLD

during the past 50 years!

This is a claim that can be substantiated. It is ample proof that Dresser Style 60 Leak Clamps never fail to provide a PERMANENT method of stopping escapes at socket and spigot joints. DRESSER CLAMPS are UNSURPASSED for reliability.

You MUST have the BEST – this name means that you get it!

Available in sizes from 2½" to 48"
DIRECT FROM WORKS TO CUSTOMER AND OBTAINABLE ONLY FROM
DRESSER MANUFACTURES (ENGLAND) LTD., *(One of the Dresser Industries)* **39 VICTORIA STREET, LONDON, S.W.1**
Telephone: ABBey 5238 Telegrams: Dresclam, Sowest, London

FWS40

TRENCHING • EXCAVATING • LOADING • BULLDOZING • BACK-FILLING

The incomparable

Dinkum Digger

Pat. Nos. 686946, 11691/53, 34122/3/4,5,6.

EVERYWHERE this versatile one-man digger is saving costs, time and labour. It will cut trenches 10" to 35" wide and down to 9 ft. deep, and with the fore-end attachments available will carry out practically every earth moving job. In under a minute it can be ready to move off under its own power at 15 m.p.h. to a new site. *Demonstrations given. Hire purchase arranged.*

Trenching for drainage close to new building with a **DINKUM DIGGER** *fitted to a Fordson Major. A* **DINKUM DIGGER** *on a Ferguson fitted with the new type cab with removable roof.*

WHITLOCK BROS. LTD.
Great Yeldham, Essex
TEL: GT YELDHAM 305 (6 lines)

REMEMBER —WARDS MIGHT HAVE IT

These five words are familiar to every buyer of machinery who scans the "Plant for Sale" columns of the national and technical press. They serve as a reminder that Thos. W. Ward are able to supply new, secondhand and reconditioned machinery of every conceivable kind, and their enormous range usually makes further searching unnecessary. But this is only a small part of the service which the Ward Group of Companies offers to industry. In the 75 years since its foundation, the Ward organisation has grown to embrace almost every facet of industrial activity. Today, Ward products and services are part of industrial life everywhere in the world.

THE TWW SERVICE INCLUDES:–

Iron & Steel · Non Ferrous Metals · Plant & Machinery · Foundry Plant & Supplies · Tractors & Earth Moving Plant Contractors' Plant & Equipment · Shipbreaking · Structural Steelwork · Excavators and Cranes · Industrial Plant · Rails & Sidings · Granite & Freestone · Roadstone & Roadmaking · Cement · Industrial Dismantling · Wire & Wire Products Nuts & Bolts · Packings & Jointings · Insulating Materials · Food Preparing Machinery · Factory Planning & Installation

LONDON, GLASGOW, MANCHESTER, BIRMINGHAM, LIVERPOOL, BRISTOL, GRAYS, WISHAW, PRESTON, BARROW, BRITON FERRY, MIDDLESBROUGH, MILFORD HAVEN, INVERKEITHING, ANTWERP, PARIS, BOMBAY, CALCUTTA, SYDNEY AND STOCKHOLM

THOS. W. WARD LTD

ALBION WORKS · SHEFFIELD

GP/41

WE HAVE SPECIALISED IN THE MANUFACTURE OF

CAST IRON PIPES AND FITTINGS

FOR ALL BRANCHES

OF INDUSTRY

FOR OVER

100 YEARS

Foulmain in Glover-West Retort House at Stockton-on-Tees

By Courtesy of the Northern Gas Board

SHAW & McINNES
Limited

Firhill Ironworks, Glasgow, N.W.

'Phones: Maryhill 1175-6-7 *'Grams:* Ironworks Glasgow

LONDON OFFICE :—
322, High Holborn,
London W.C.1
Tel. CHAncery 3878 & 3907

MANCHESTER OFFICE :—
28, Kennedy Street,
Manchester 2.
Tel. CEN. 6341

Precision Manufacture
is the answer

Why do Gas Engineers specify the Monitrol Automatic Shut-off Valve? One reason is that the design and methods of manufacture of the Monitrol are based on the specialised American experience of the Robertshaw-Fulton Controls Company.

MONITROL
AUTOMATIC
Shut off **VALVE**

Produced in co-operation with the Robertshaw-Fulton Controls Company U.S.A.

Manufactured throughout in an air-conditioned factory.

High precision components instrument assembly techniques employed.

Magnet surfaces ground to flatness limits never before achieved in quantity production

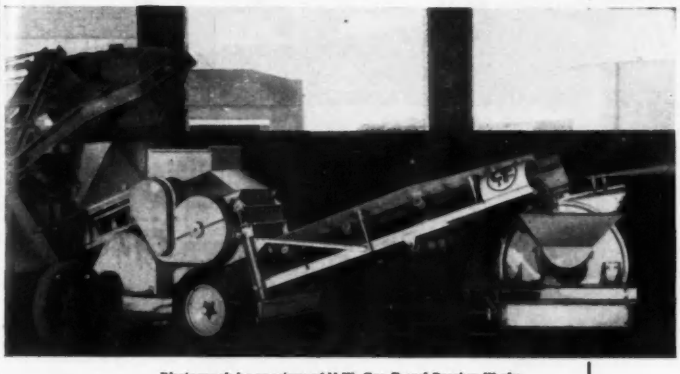
Send for this informative, fully illustrated booklet describing the construction, operation and installation of the Monitrol Valve Thermo-Couple and Pilot Burner.

MONITOR ENGINEERING & OIL APPLIANCE LTD. STECHFORD, BIRMINGHAM 33. *A Member of the Parkinson & Cowan Group.*

C & T LTD. 30 TONS PER HOUR OXIDE HANDLING EQUIPMENT

is used at

FISHBURN...



Photograph by courtesy of N.W. Gas Board Preston Works

Photograph by courtesy of N.W. Gas Board Wallasey Works

OXIDE BREAKING

C. & T. Mobile Equipment receiving from a mobile shovel oxide in hard lumps up to 18" cube, and reducing it down to 80% minus $\frac{1}{8}$" size. This equipment, which has a capacity of 30 tons per hour, consists of the C. & T. "Bigrampus" Mobile Crusher-Feeder and the C. & T. Mobile Disintegrator. *Two men only* are required to achieve this high hourly output, namely the mobile shovel driver and the man who tends the two C. & T. machines.

OXIDE CONVEYING

A mobile shovel delivering prepared oxide to a C. & T. Standard Feed Unit which transfers the oxide to a chain of C. & T. "Foxhound" Conveyors. The last "Foxhound" discharges direct into a purifier box. The C. & T. machines can handle the oxide as fast as the men in the purifier boxes can spread it.

C. & T. equipment as illustrated above has been selected by the National Coal Board for the Fishburn Gas Works.

WE WILL BE GLAD TO SEND YOU FULL PARTICULARS OF THE COMPLETE RANGE OF C. & T. HANDLING EQUIPMENT WITH CAPACITIES FROM 2 TO 30 TONS PER HOUR, ON REQUEST.

CRONE & TAYLOR (ENGINEERING) LTD.

SUTTON OAK, ST. HELENS, LANCS. C & T LTD. TELEPHONE: ST. HELENS 3397

CRO 5004

HARDMAN & HOLDEN LIMITED

Are pleased to inform the Gas Industry that adequate supplies of the necessary raw materials are now available for the manufacture of increased quantities of

MANOX OXIDE

They are therefore in a position to supply all normal requirements of this well-known purifying material and can offer prompt delivery by road or rail.

HARDMAN & HOLDEN LIMITED

Manox House, Miles Platting, Manchester 10

Telephone : COLlyhurst 1551

Telegrams : OXIDE MANCHESTER

BOILERS

HIGH VELOCITY · ULTRANOMIC
ECONOMIC · STEEL SECTIONAL
HOT WATER · WASTE HEAT

Paxman

DAVEY, PAXMAN & CO. LTD, COLCHESTER

TELEPHONE: 5151 TELEGRAMS: PAXMAN COLCHESTER

J.H.C ALUMINIUM SERVICE GOVERNORS

JEAVONS

★ Incorporating the latest improvements in Governor Technique.
★ Designed for moderate gas loads—for larger capacities specify J.46.
★ Compensated against inlet pressure fluctuations.
★ Immediate delivery.

Details and samples on application.

JEAVONS ENGINEERING CO.,

TIPTON · STAFFS · (PROPS: E. E. JEAVONS & Co. Ltd) · 'Phone: TIPTON 2161 'Grams: 'PIPELINES' TIPTON.

Serving Hand-in-Hand....

FRYSOL Flux & FRY'S Solders

These soldering products from FRY'S are made for each other! And both are old friends of Mr. Therm. Gas Meter manufacturers and Gas Boards use FRYSOL Soldering Fluid. This flux has a fast cleansing action, combined with properties that facilitate a fast smooth spread of solder. FRY'S solders have been in use for over 25 years, and when used in conjunction with the FRYSOL flux, manufacturers are assured of quick, trouble-free jointing in all stages of production and repair.

CAN FRY'S HELP IN YOUR WORKS?

Our Research and Advisory Department is constantly advising manufacturers with soldering problems. If there is a process in your works which you feel may be improved, please contact us for impartial, expert advice. Export inquiries invited.

FRY'S Metal Foundries Limited

33

TANDEM WORKS, MERTON ABBEY, S.W.19 MITcham 4023

And at MANCHESTER · GLASGOW · BRISTOL · BIRMINGHAM & DUBLIN

REMOTE CONTROL

makes gas distribution a one man job!

The district stations in the Southern Group of the Central Division, Southern Gas Board, are remotely controlled from a room at Aldershot. The remote control scheme has been designed jointly by Automatic Telephone & Electric Co. Ltd., who supplied the remote control equipment, and the Bryan Donkin Co. Ltd., who supplied the governors, valves, compressors etc. By means of a single pair of telephone wires to each district station, or to two district stations on a party line basis, e.g., Bordon and Alton, this equipment provides all the following facilities:

(*a*) Remote indication of pressure at inlet to volumetric governor.

(*b*) Remote indication of flow through volumetric governor into station.

(*c*) Remote control of flow into station.

(*d*) Remote indication of gasholder stocks, with audible and visible alarms for high and low limits.

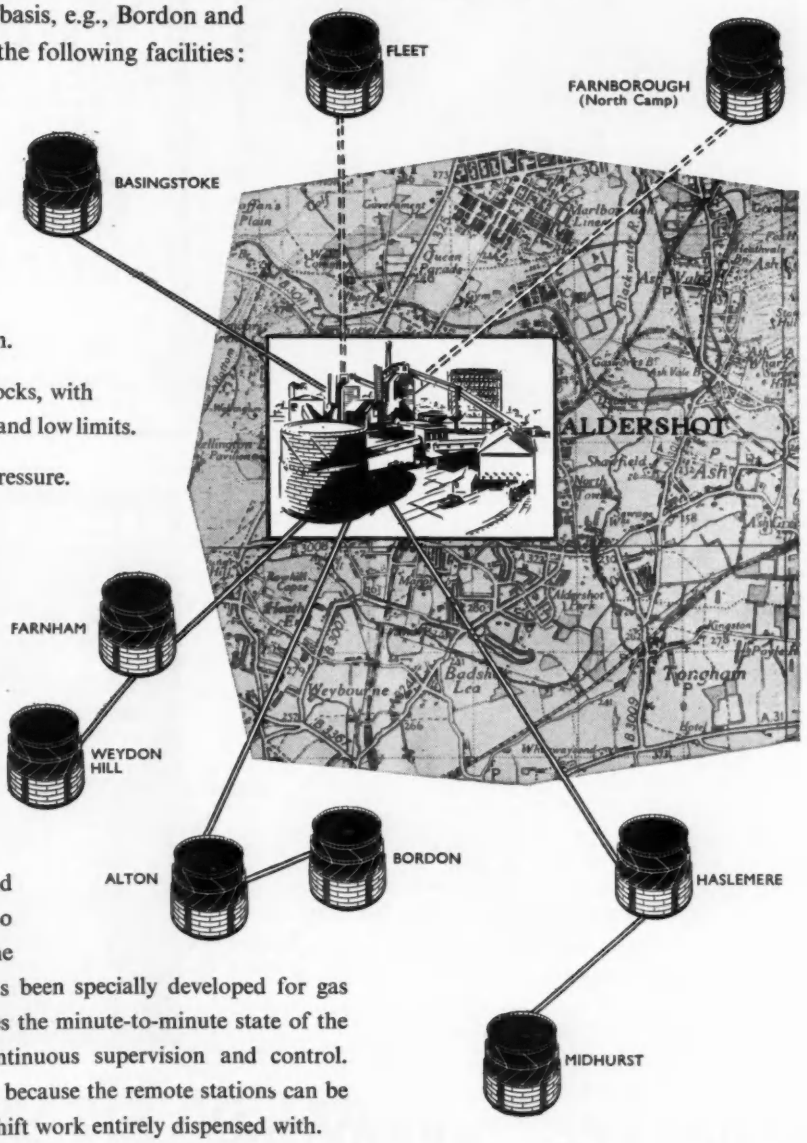
(*e*) Remote indication of the district pressure.

(*f*) Remote control (start/stop) and indication (running/stopped) of the station booster.

(*g*) Remote indication and alarm of electricity supply failure.

(*h*) Equipment testing facilities.

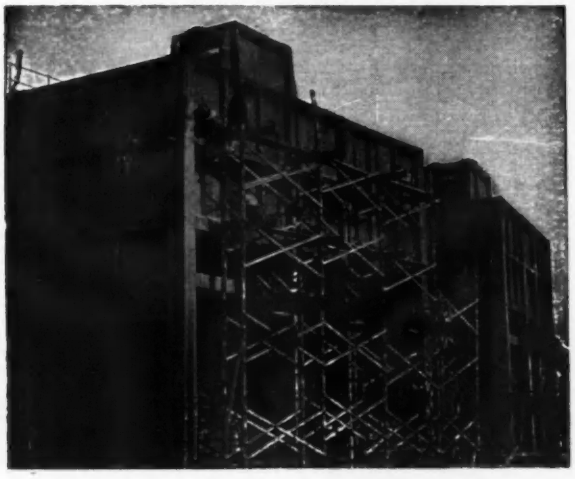
(*i*) Telephone communication.



Supervisory Remote Indication and Control Equipment can be applied to interlinked schemes of any size. The equipment employed at Aldershot has been specially developed for gas distribution control and its use enables the minute-to-minute state of the distribution system to be under continuous supervision and control. Saving of man-power is considerable, because the remote stations can be left unattended for long periods and shift work entirely dispensed with.

AUTOMATIC TELEPHONE & ELECTRIC CO. LTD.
STROWGER HOUSE, ARUNDEL STREET, LONDON, W.C.2
Telephone: TEMple Bar 4506 Telegrams: Strowger Estrand London Strowger Works, Liverpool 7
THE BRYAN DONKIN CO. LTD. CHESTERFIELD
AT 4522-A23

Gunite



One of the reinforced concrete structures reconditioned with Gunite for the City of Carlisle Gas Undertaking.

Gunite—concrete applied by air pressure—has numerous applications where its great density and extreme adhesion have exceptional value.

For repairing reinforced concrete it has particular merit, as, due to the method of application, a uniform density and adherence is obtained whenever Gunite is applied.

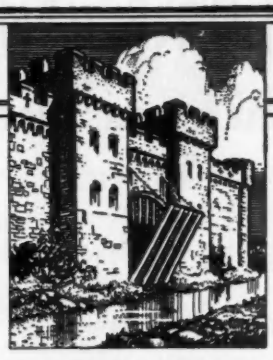
For lining coal bunkers and steel chimneys it possesses great resistance to corrosion and protects steel-work from the abrasive action of coal or coke.

Handbook "GUNITE" sent on request

THE CONCRETE PROOFING CO., LTD.

100, VICTORIA STREET, S.W.1

Telephone : Victoria 7877 & 6275



PROTECTION

GAUNTLET

GAUNTLET

WEATHER TESTED PAINTS

ARCHD H. HAMILTON & CO. LTD

27-37 BARDOWIE STREET POSSILPARK GLASGOW.N

STEEL TUBES & FITTINGS

FOR

Gas, Water & Steam

TRADE MARK

RUSSELL BROS (WALSALL) LIMITED

BRADFORD TUBE WORKS-WALSALL-ENGLAND

The Bradford Tube Works occupies a factory area of some three acres exclusively devoted to the manufacture of Steel Tubes and Fittings.

Contractors to Admiralty and War Office. Extensive stocks.

sm/RB 1008/2

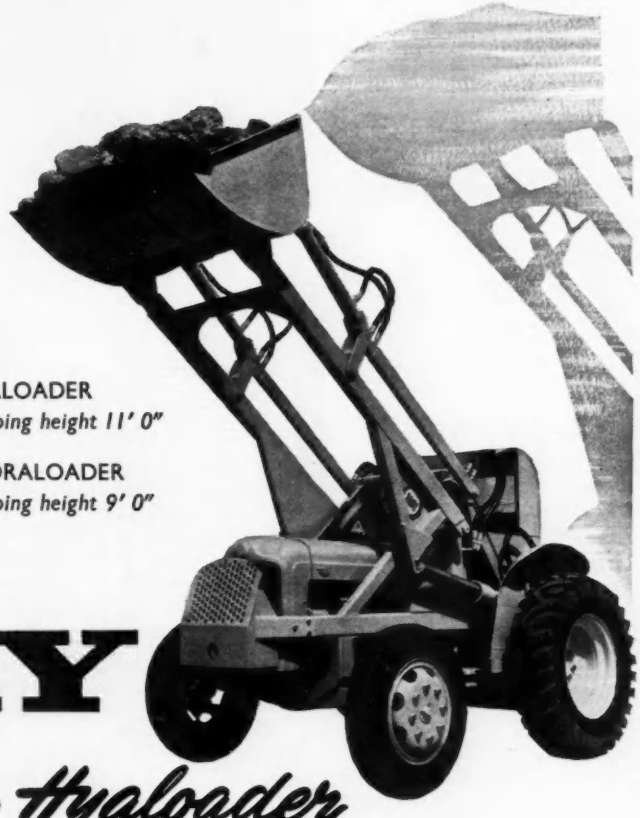
IF

bulk handling of materials is an essential part of your business . . . or you would like to bring down the cost of moving fuel or rubbish . . . then you should know about "FULL POWER CROWD"

WHAT YOU GET WITH "FULL POWER CROWD"

GREATER DIGGING POWER
BIGGER PAY-LOAD EVERY DIG
SAFER, SPEEDIER OPERATION
HIGHER DUMPING SPEEDS
ABILITY TO TACKLE JOBS THAT OTHER LOADERS COULDN'T ATTEMPT

BRAY HYALOADERS and HYDRA-LOADERS are available in ½, ¾, 1, 1¼ and 2 cubic yard capacities. Easily fitted attachments include CRANE, DOZER BLADE, SNOW PLOUGH, FORK-LIFT and HOIST



HYALOADER
dumping height 11' 0"

HYDRALOADER
dumping height 9' 0"

BRAY

Hydraloader AND *Hyaloader*

THE **ONLY** LOADERS WITH "FULL POWER CROWD"

W. E. BRAY & CO. LTD.
FELTHAM · MIDDLESEX
Tel: Feltham 3471/2/3/4. Grams: "Braydozer, Feltham"

The facts, figures and details are yours for the asking— write or 'phone today.

The A & M Minimeter

Make mine a small scotch

A toast to the A & M Minimeter—now available as an ordinary, soon as an optional P.P. meter. With a capacity of 100 c. ft. per hour, ·05 c. ft. per rev., this compact little champion with 5-lt. connections measures only

10¾" high
8½" wide
6¼" deep

The prepayment mechanism adds 2¼" to the total width.

light but sturdy, it's "a small scotch" . .

. . . Made by

Alder & Mackay Ltd. *Gas Meter Manufacturers*
New Grange Works, Edinburgh
Douglas Street Works, London & Branches

INDEX TO 'JOURNAL' ADVERTISERS

A — PAGE

A.C. Machinery, Ltd. ... ...
Abbott, Birks & Co., Ltd. ... ...
Acme Wringers, Ltd. ... ...
Aerotherm Co., Ltd. ... ...
Aerograph Co., Ltd. ... ...
Aldridge & Mackay, Ltd. 726
Aldridge & Ranken Ltd. ... ...
Alexander Controls, Ltd. ... ...
Allen Taylor (Engineers), Ltd. ... ...
Amal, Ltd. ... ...
Ascot Gas Water Heaters, Ltd. ... ... Cover IV
Ascot Gas Water Heaters, Ltd. (F. A. Neat) ...
Ashmore, Benson, Pease & Co. ... ...
Aspinall's (Paints), Ltd. ... ...
Associated Lead Manufacturers, Ltd. ... ...
Associated Lead Manufacturers, Ltd. (Rustodian)
Atlas Preservative Co., Ltd. ... ...
Audley Engineering Co., Ltd. ... ...
Autocontrol Boilers, Ltd. ... ...
Automatic Telephone & Electric Co., Ltd. ... 723
Automotive Products, Ltd. ... ...

B

Bailey & Church, Ltd. 763
Balfour, Henry, & Co., Ltd. ... ...
Bayswaco Meters, Ltd. ... ...
Benham & Sons, Ltd. ... ...
Blakeley Firth, Sons & Co., Ltd. 700
Bolton's Superheater & Pipe Works Ltd. ...
Booth, John, & Sons (Bolton), Ltd. ... ...
Bratt Colbran, Ltd. ... ...
Bray, George, & Co., Ltd. ... ...
Bray, W. E., & Co., Ltd. 725
Bristols Instrument Co., Ltd. ... ...
British Flint & Cerium Manufacturers, Ltd. ...
British Gas Purifying Materials Co., ...
British Oxygen Co., Ltd. ... ...
British Paints, Ltd. ... ...
British Rototherm Co., Ltd. ... ...
British Thermostat Co., Ltd. 711
British Thomson Houston, Ltd. ... ...
British Vacuum Cleaner & Engineering Co., Ltd. 704
Broadbent, Thomas, & Sons, Ltd. ... ...
Brockhouse Heater Co., Ltd. ... ...
Broom & Wade, Ltd. ... ...
Brown, J., & Co., Ltd. ... ...
Bugden, Thos., & Co. ... ...

C

Cambridge Instrument Co., Ltd. ... ...
Cannon (G. A.), Ltd. ... ...
Cascade Water Coolers, Ltd. ... ...
Cementation Co., Ltd. ... ... Cover II
Chaseside Engineering Co., Ltd. ... ...
Cinema-Television, Ltd. ... ...
Clapham Bros., Ltd. ... ...
Clayton, Son & Co., Ltd. ... ...
Clifford Engineering Co., Ltd. ... ...
Cochrane (Middlesbro') Foundry, Ltd. 766
Cohen, George, Sons & Co., Ltd. ... ...
Concrete Proofing Co., Ltd. 724
Consolidated Pneumatic Tool Co., Ltd. ... ...
Consett Iron Co., Ltd. ... ...
Crane, Ltd. 694
Crone & Taylor, Ltd. 719
Crosby & Co., Ltd. ... ...
Crossley Bros. ... ...
Crowley Russell, & Co., Ltd. 713
Curtis, A. L., & Co. ... ...
Cutler, Samuel, & Sons, Ltd. ... ...

D

Davey, Paxman & Co., Ltd. 721
De la Rue, Thomas, & Co., Ltd. (Gas Group) 714, 715
Dempster, R. & J., Ltd. ... ...
Dempster, Robert, & Sons, Ltd. ... ...
Denison & Son, Ltd. ... ...
Derbyshire Silica Firebrick Co., Ltd. ... ...
Diaphragm & General Leather Co., Ltd. ...
Dick, R. & J., Ltd. ... ...
Donkin (The Bryan) Co., Ltd. ... ... Cover II
Douglas, Wm., & Sons, Ltd. ... ...
Drakes, Ltd. ... ...
Dresser Manufactures (England), Ltd. 716
Drew, H. B., Ltd. ... ...
Dunlop & Ranken, Ltd. ... ...
Dunlop Rubber Co., Ltd. (Gen. Rubber Goods Division) ... ...

E

E.B. Refractory Cement Co., Ltd. ... ...
Edgar, William, & Son, Ltd. ... ...
Elcontrol, Ltd. ... ...
Electroflo Meters Co., Ltd. 701
Electrolux, Ltd. ... ...
Elliott Bros. (London), Ltd. ... ...
Ether, Ltd. ... ...
Ewart Chainbelt Co., Ltd. ... ...
Expanded Metal Co., Ltd. ... ...

F

Fisher & Ludlow, Ltd. ... ...
Flavel, S., & Co., Ltd. 749
Fowler, John, & Co. (Leeds), Ltd. 696
Franki Compressed Pile Co., Ltd. ... ...
Franklin Furnace Co., Ltd. ... ...
Fry's Metal Foundries, Ltd. 722
Fyffe & Co., Ltd. ... ...

G — PAGE

Gas Purification & Chemical, Ltd. 763
General Descaling Co., Ltd. ... ...
General Electric Co., Ltd. 699
General Gas Appliances, Ltd. ... ...
Gibbons Bros., Ltd. ... ...
Glover, George, & Co., Ltd. ... ...
Glover, Thomas, & Co., Ltd. 730
Goodall Clayton & Co., Ltd. ... ...
Goodyear Mechanical Goods 755
Graphite Products, Ltd. ... ...
Green & Boulding, Ltd. ... ...

H

Hamilton, A. H., & Co., Ltd. 724
Hardman & Holden, Ltd. 720
Harris & Pearson, Ltd. ... ...
Harrisons (London), Ltd. 764
Harvey, G. A., & Co. (London), Ltd. ... ...
Hattersley & Davidson ... ...
Hick Hargreaves & Co., Ltd. ... ...
Hilmor, Ltd. ... ...
Hills (West Bromwich), Ltd. ... ...
Holman, Michell & Co., Ltd. ... ...
Holmes, W. C., & Co., Ltd. ... ...Cover 1, 765
Hopkinsons, Ltd. ... ...
Horseley Bridge & Thomas Piggott, Ltd. ... 703
Horstmann Gear Co., Ltd. ... ...
Howden, James, & Co., Ltd. ... ...
Humphreys & Glasgow, Ltd. 728

I

Ideal Boilers & Radiators, Ltd. ... ...
I.C.I., Ltd. (Metals Division) 706
Ingham, John, & Sons, Ltd. ... ...

J

Jeavons, E. E., & Co., Ltd. ... ...
Jeavons Engineering Co. 721
Jenkins, W. J., & Co., Ltd. 709
Jobling, James A., & Co., Ltd. ... ...
Johnson, C. H., (Machinery), Ltd. ... ...

K

Keay, E. C. & J., Ltd. ... ...
Keith Blackman, Ltd. 766
Kent, Geo., Ltd. ... ...
Kings Patent Agency, Ltd. 764
King, Walter, Ltd. 762, 763
Kirk & Co. (Tubes), Ltd. ... ...
Kirkham Hulett & Chandler, Ltd. ... ...

L

LaFarge Aluminous Cement Co., Ltd. ... ...
Laidlaw, R., & Son (Edin.), Ltd. 704
Lamont, James H., & Co., Ltd. ... ...
Lanarkshire Bolt & Rivet Co., Ltd. 708
Lancashire Dynamo & Crypto, Ltd. ... ...
Le Bas Tube Co., Ltd. 705
Leeds Fireclay, Co., Ltd. ... ...
Lionweld, Ltd. ... ...
Lind, Peter, Ltd. ... ...

M

Macpherson, Donald, & Co. Ltd. ... ...
Magnetic Valve Co., Ltd. ... ...
Main, R. & A., Ltd. 756, 757
Measurements, Ltd. ... ...
Meltham Silica Fire Brick Co., Ltd. ... ...
Meters, Ltd. ... ...
Metropolitan Leather Co., Ltd. ... ...
Metropolitan Vickers Electrical Co., Ltd. ... ...
Milnes Meters, Ltd. 708
Mint, Birmingham, Ltd. ... ...
Mitcham Smelters, Ltd. ... ...
Mitchell Engineering, Ltd. ... ...
Mitchell, H., & Co. ... ...
Moler Products, Ltd. 729
Monitor Engineering & Oil Appliances, Ltd. ... 718
Monk, A., & Co., Ltd. ... ...
Mucklow Bros., Ltd. ... ...

N

National Benzole Co., Ltd. ... ...
National Enamels, Ltd. ... ...
New Conveyor Co., Ltd. ... ...
Newton Chambers & Co., Ltd. ... ...
Norwest Construction Co., Ltd. 693
Nu-Swift, Ltd. 763

O

Oxley Engineering Co., Ltd. ... ...

P

Parkinson & Cowan (Gas Meters), Ltd. 730
Parkinson Stove Co., Ltd. ... ...
Pass, E., & Co., Ltd. ... ...
Peckett & Sons, Ltd. ... ...
Peebles & Co., Ltd. 712
Perl Controls, Ltd. ... ...
Plenty & Son, Ltd. ... ...
Power-Gas Corporation, Ltd. ... ...
Pratt Engineering Co 762
Press, William, & Son, Ltd. ... ...
Pulsometer Engineering Co., Ltd. ... ...

R — PAGE

Radiant Heating, Ltd. 707
Radiation, Ltd. 750, 751
Rawlplug Co., Ltd. 700
Reavell & Co., Ltd. 762
Remington Rand, Ltd. ... ...
Richmond Welding Co. ... ...
Ride & Bell, Ltd. ... ...
Riley, A. J., & Son, Ltd. ... ...
Roberts, R. E., & Sons, Ltd. 764
Robinson, J. H., & Co. (Liverpool), Ltd. ... ...
Rook Bros., Ltd. 763
Royston, Geo., & Sons, Ltd. ... ...
Russell Bros. (Walsall), Ltd. 724
Russell, R., & Sons, Ltd. 762

S

Salter, T. E., Ltd. ... ...
Senior Economisers, Ltd. ... ...
Shaw & McInnes Ltd. 718
Shelton Iron, Steel & Coal Co., Ltd. ... ...
Siebe Gorman & Co., Ltd. ... ...
Siemens-Schuckert (Great Britain), Ltd. ... ...
Sigma Instrument Co., Ltd. ... ...
Simon-Carves, Ltd. ... ...facing p. 743
Simon, Richard, & Sons, Ltd. ... ...
Sisson, W., & Co., Ltd. ... ...
Smith Meters, Ltd. ... ...
Smith, Thos., & Sons (Rodley), Ltd. ... ...
Spencer Bonecourt, Ltd. ... ...
Sperryn & Co., Ltd. ... ...
Stanton Ironworks Co., Ltd. ... ...
Staveley Iron & Chemical Co., Ltd. ... ...
Steels Eng. Products, Ltd. ... ...
Stein, John G., & Co., Ltd. 696
Stelcon (Industrial Floors) Ltd. ... ...
Stewart & Gray, Ltd. ... ...
Stewarts & Lloyds, Ltd. ... ...
Stoves, Ltd. 695
Strachan & Henshaw, Ltd. ... ...
Stringer Bros. ... ...
Sugg, Wm., & Co., Ltd. 702
Summerson, Thos., & Sons, Ltd. ... ...
Sutcliffe Speakman & Co., Ltd. ... ...
Sutherland, A. G., Ltd. ... ...

T

T & T Works, Ltd. ... ...
Tangyes, Ltd. ... ...
Thermal Syndicate, Ltd. ... ...
Thomas & Bishop, Ltd. ... ...
Thompson, John, Conveyor Co. ... ...
Thorp, Thomas, & Co., Ltd. ... ...
Tucker, Eyelet, Geo., Co., Ltd. ... ...
Tully Engineering Co., Ltd. ... ...
Turners Asbestos Cement Co., Ltd. ... ...

U

Underpressure Engineering Co., Ltd. ... ...
United Kingdom Construction & Engineering Co., Ltd. 710

V

Victaulic Co., Ltd. ... ...
Visco Engineering Co., Ltd. ... ...
Vulcan Stove Co., Ltd. ... ...

W

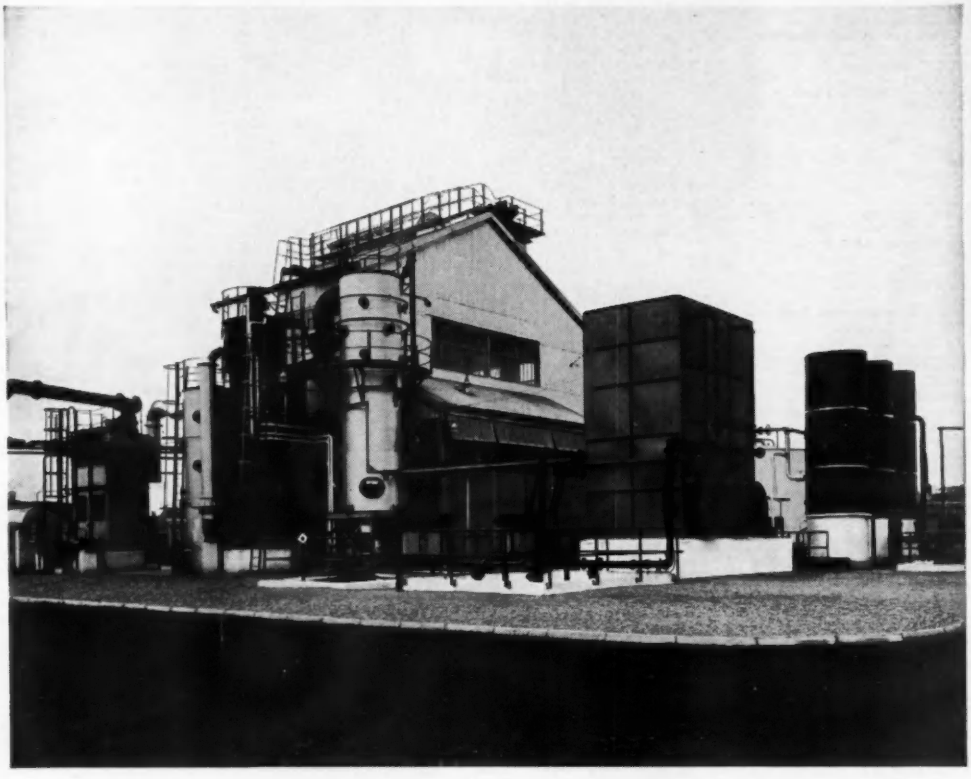
Wakelin, F. H., Ltd. ... ...
Walker, C. & W., Ltd. ... ...
Walker, Crosweller & Co., Ltd. ... ...
Walker, Wm., & Sons (Hanley), Ltd. ... ...
Waller, George, & Sons, Ltd. ... ...
Ward, Thos. W., Ltd. 717
Weir, G. & J., Ltd. ... ...
Wellington Tube Works, Ltd. ... ...
Wellman Smith Owen Engineering Corpn., Ltd. 698
West's Gas Improvement Co., Ltd. ... Cover III
West's Gas Improvement Co., Ltd. (C.O.L.) Division) ... ...
West Hunwick Silica & Firebrick Co., Ltd. ...
West's Piling & Construction Co. ... ...
Westwood & Wrights, Ltd. ... ...
Whessoe, Ltd. ... ...
Whitlock Bros., Ltd. 716
Whittaker Hall & Co. (1929), Ltd. ... ...
Wilkes, A. H., & Co., Ltd. ... ...
Willey & Co., Ltd. 697
Williams, John E., Ltd. ... ...
Williamson Cliff, Ltd. ... ...
Wilson, George, Gas Meters, Ltd. ... ...
Winn & Coales, Ltd. ... ...
Woodall-Duckham Construction Co., Ltd. facing p. 742
Wood, Hugh, & Co., Ltd. ... ...

Y

Yorkshire Copper Works, Ltd. ... ...

Agency ... ...
Appointments Vacant 763, 764
Appointment Wanted ... ...
Contracts Open ... ...
Educational ... ...
Miscellaneous ... ...
Patents 764
Plant, &c., For Sale ... ...
Publications ... ...
Repair Work ... ...

CATALYTIC OIL GAS PLANT
ONIA-GEGI PROCESS



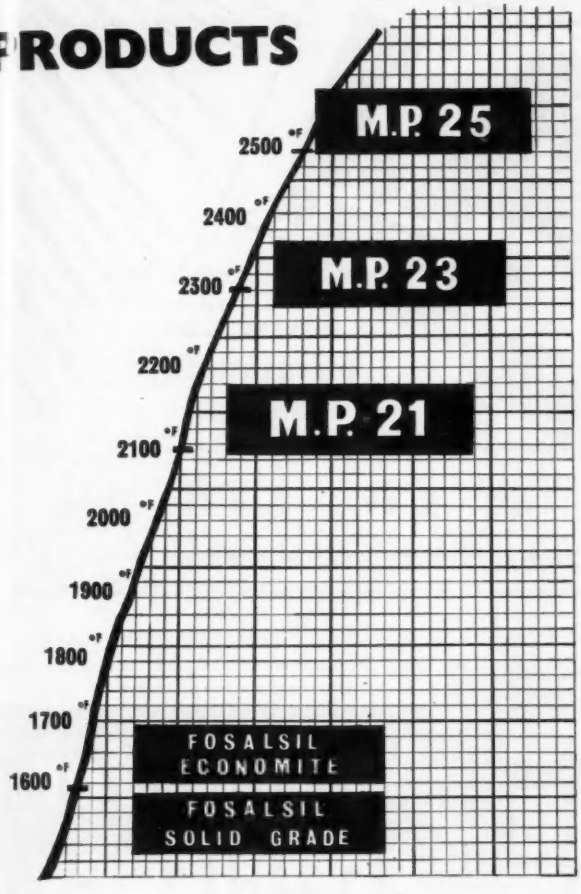
Installation at the Stafford Works of the West Midlands Gas Board.

The Humphreys-Glasgow Catalytic Oil Gas Plant utilising the ONIA-GEGI Process produces Town Gas of normal quality from Heavy Oil, Natural Gas or Refinery Gas.

HUMPHREYS & GLASGOW LTD
HUMGLAS HOUSE · CARLISLE PLACE · LONDON · S.W.1
Telephone: VICtoria 3961
ESTABLISHED 1892

FOSALSIL MOLER M.P.

PRODUCTS



"Our technical advisory service offers you the benefit of its knowledge and experience".

FOSALSIL & M.P. *insulation*

Available in brick, block or aggregate form, Moler Products heat insulating materials combine a high degree of insulating efficiency with adequate mechanical strength. The wide range includes a suitable grade for every type of industrial plant.

MOLER PRODUCTS LIMITED

HYTHE WORKS . COLCHESTER

Phone: COLchester 3191 (3 lines) Grams: FURMOL COLCHESTER

Gas Journal

VOL. 280 NO. 4776 DECEMBER 15, 1954

106TH YEAR

MANAGING DIRECTOR: Clifford A. King

EDITOR: Trevor G. Williams, A.M.I.Mech.E., Assoc.Inst.Gas E., M.Inst.F.

DEPUTY EDITOR: Arthur C. Cross

Published by Walter King Limited, 11, Bolt Court, Fleet St., London, E.C.4

Telephone: Central 2236-7. Telegrams: Gasking, Fleet.

CONTENTS

EDITORIAL COMMENT

Refractories Research 731
An Economic Stabilizer 732

TECHNICAL RECORD

45th Report of the Joint Refractories Committee: 1953-54 .. 734
Carburetted Water Gas Cooling and Condensing. By L. Silver 740
Disposal of Products of Combustion from Gas Appliances. By A. R. Bennett and H. Reichert 743
The Selection of Driving Units for Gas Compressors. By D. F. Rudge 746

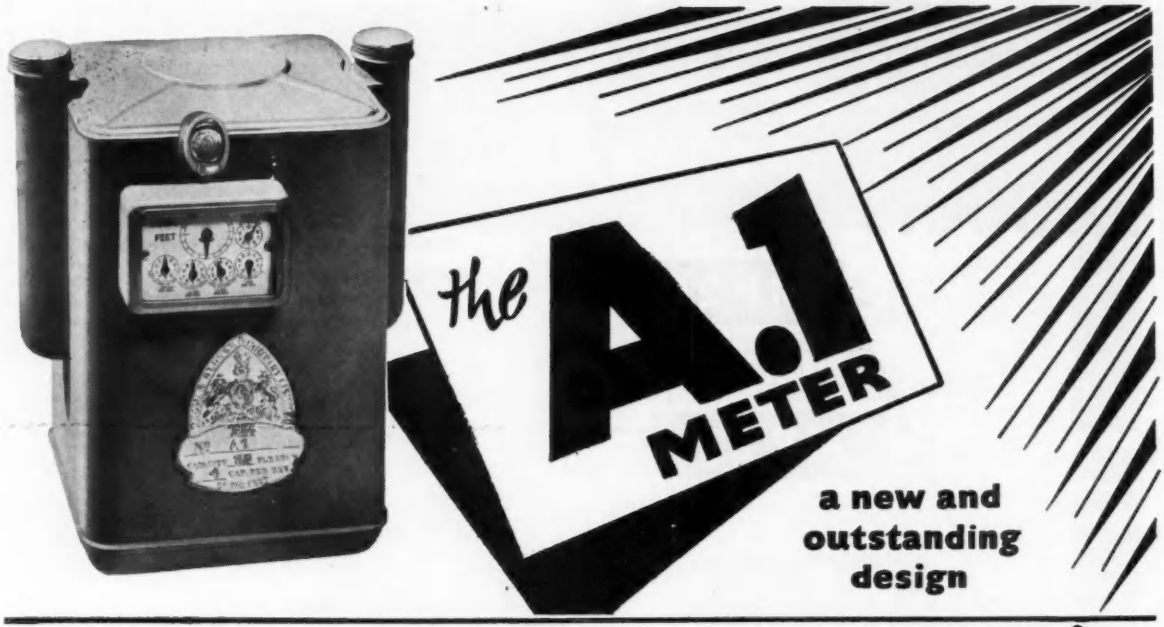
CURRENT EVENTS

Personal 733
Obituary 733
Miss Burgess's Successful Tour 737
Diary 733
Institute of General Managers 733
2,000 Visitors to Flavels 733
Gas in Industry: New Gas Council brochure 738
Swiss Association of Gas and Water Engineers 748
C.U.C. Easy Payment Scheme 748
Ham and Eggs: Gas at Smithfield and Poultry Shows .. 754
Western Juniors' Red Letter Day 758
Woodside Stoker Works Press Visit 759
North of England Section 759
Trade News 760

GAS CONSULTATIVE COUNCILS

Cooker Cleaning Problems in Somerset; North Thames Results Reviewed; Lord Mayor's Hospitality 752

PUBLISHERS NOTICE, SEE PAGE 763



THOMAS GLOVER & CO. LTD.

GOTHIC WORKS, ANGEL ROAD, EDMONTON, LONDON, and BRANCHES

TG13

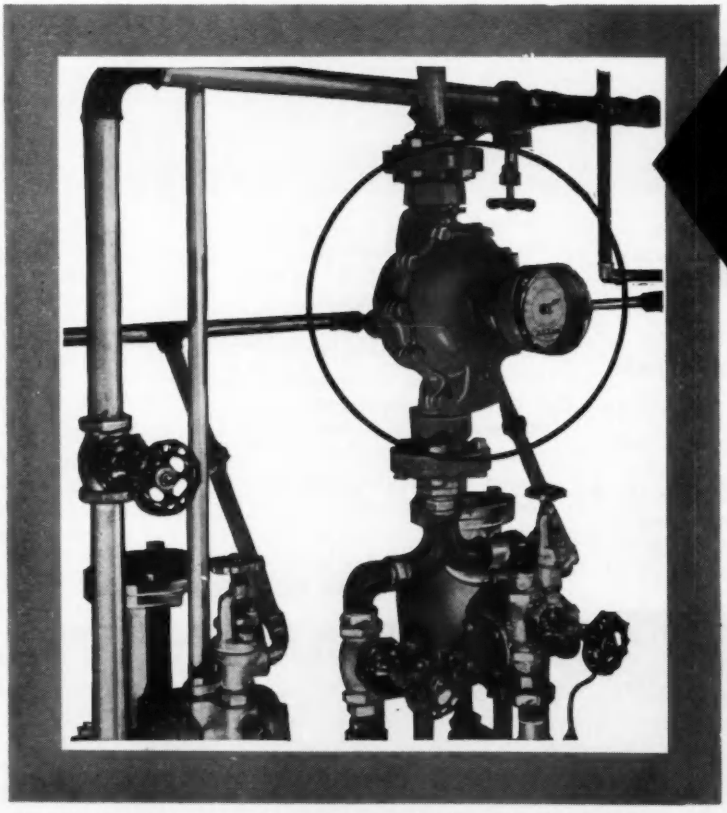


Illustration of a boiler feed meter installed at United Phosphate Ltd., valves by Crane

METER for EFFICIENCY

how we help industry to know its costs

We are manufacturers of

LIQUID PROCESS METERS
BOILER FEED METERS
TELEMETERING EQUIPMENT
LEVEL INDICATING EQUIPMENT
CONTROL APPARATUS

MEASUREMENT LTD

P.O. BOX 18
119, UNION STREET, OLDHAM, LANCS.
Phone MAin 6432

A COMPANY OF THE PARKINSON AND COWAN GROUP

Gas Journal

VOLUME 280 . No. 4776. DECEMBER 15, 1954. 106th YEAR

Refractories Research

THE impression made by the 45th Report of the Joint Refractories Committee is one of practical topicality. The British Ceramic Research Association (B.C.R.A.) has come down from the cloudland of fundamental research to the rough and tumble of the retort house. Works trials of foreign silica goods in the flaking zone of continuous verticals; blending silica raw materials, indicating one direction in which it is sought to get equal results with indigenous materials: iron spots: temperature surveys in continuous vertical retorts: all these are intensely practical. And the short reports of 'other investigations' reveal that more is in hand or to come; this additional information will be awaited with interest.

A very satisfactory feature of the first two sections of the report is that, as far as they go, they show definite results. 'What is important is that in every case the fired material possessing the lowest porosity and permeability gave the lowest incidence of flaking'. Manufacturers are collaborating with users and investigators in developing British refractories in this direction. It had already been 'concluded that bricks of lower porosity and lower permeability could be made from cryptocrystalline quartzites than from those of larger crystal size'. We take it that the big word means 'with small crystals'. The explanation seems to be that when the crystals are (comparatively) large the brick texture is opened up by 'localized conversion of quartz' during firing, with an increase of porosity. The results were inconclusive with the three materials selected for blending, 'and further investigations are therefore required'. We believe that manufacturers in collaboration with some users are already working on this problem, not only in blending but in the grinding, pressing and general working-up of the raw materials.

'It seems clear', says the Report, 'that a considerable improvement in flaking resistance might be effected if the apparent porosity of silica material could be reduced to a figure round or below 18%'. We may reach that, but shall we be sure that other properties will be equally satisfactory? Will the closer, denser material be more, or less, flexible under expansion movements than some now in use? High silica material is less porous than siliceous material; but it is notoriously more rigid, more liable to cracking, and we may turn to a very short report on what seems at first to be a very academic subject but which may throw some light on this. In the determination of Young's Modulus of refractories at various temperatures there are two significant sentences, 'Whereas a well-converted silica brick was only 20% stronger at 1,000°C. than at room temperature, the strength of the siliceous specimen had increased by 150%'. And 'this increase of strength must occur through a tightening up of the structure, and it is possible that the porosity and permeability are also reduced as the temperature is increased'. It may be that it is precisely this possibility of a 'tightening up of the structure' which accounts for the satisfactory longevity of some siliceous retorts after they have got safely through the early stages of working.

The work on iron spots has a touch almost of humour in its conclusion. These ugly-looking blemishes have apparently frightened us unnecessarily. 'Though rejection of iron-spotted bricks is carried out and standards for rejection are laid down by individual users, there is no evidence that iron spots are deleterious in service'. Still we shall all agree that the bogy should be well and truly laid by 'service trials of retorts built of iron-spotted material of the type normally rejected', as promised by Professor Roberts.

Reverting to flaking, Dr. Haffner's contribution to the discussion was extremely interesting and valuable. He evaluated flaking in terms of loss of materials in cubic inches per 1,000 tons of coal carbonized. He suggested that this would be lower when making gas at lower calorific values. Would this be due to the cooling effect of unconverted steam in the upper zones of the retort? Siliceous materials in spite of high porosity, he said, were more resistant to flaking even than the French and South African silica, but, alas! 'This desirable quality is offset by its vulnerability to ash attack,' leading to longing looks at the possibilities of zoning—siliceous in the flaking zone and silica in the lower zones. His remarks on the behaviour of sillimanite will also be noted, as well as his announcement of further trials. His observations are confirmed by those reported by Mr. R. O. Richards of the Woodall-Duckham Construction Co., Ltd., who rightly emphasized the importance of keeping in mind the many factors which affect 'the pattern of deterioration of a retort in service'. The experiences of his great Company with sillimanite 25 years ago had been practically the same as that now reported.

The temperature surveys of continuous verticals in the heating-up period are extremely interesting. It seems clear, as Dr. Haffner pointed out, that serious

damage might be done to the retort structure at this stage. One sentence in his contribution stands out. 'The importance of uniform heating emphasizes the need to design settings with a *maximum degree of symmetry and simplicity* in structure and heating system'. There is practical point too, in Mr. Bradshaw's suggestion that the rate of heating-up ('the target rate of rise') should be 'sufficiently steep', when 'variations become merely changes in rate of heating and the danger of cooling is avoided'. The importance of keeping the heating going has long been recognized. Some years ago experiments were made with the use of a gas burner inside the retort to prevent recession of heating-up and to smooth-out and expedite drying. Would it not be well if Mr. Laming made a trial of this too?

Dr. A. T. Green, our genial Director of Ceramic Research, speaking on the invitation of the President, at the end of the debate, selected this work of the temperature surveys for special commendation. It was work 'in the direction of weighing up the actions taking place in the retort itself . . . . the first real dig in this particular direction.'

The discussion of this Report is extremely good; it is difficult to summarize it. We have said nothing, for instance, about Mr. Bishop's interesting remarks on 'flaking' in horizontal retorts although they will well repay careful study. And there is much in the shorter items in the Report to give satisfaction. We shall look forward, for instance, to the results in due course of the report on the four different materials being used in the four separate branches which are coming into operation 'at a West Midlands gasworks'—we believe it is no secret that this is the very fine installation which has been installed by Mr. Stanier at his Etruria works. It is a magnificent 'experiment' indeed.

Dr. Haffner summed up the impression with which we started. 'From the point of view of those who design and operate retorts, this Report is one of the most comprehensible and helpful; it leads to confidence that our bread and butter problems are being well tackled'.

An Economic Stabilizer

QUITE appropriately, for five years is a reasonable stocktaking period, the recently issued annual reports of the Gas Council and the area boards included a retrospect of their achievements and disappointments since vesting day, but the reports of the gas consultative councils which formed appendices to the 12 area reports confined themselves to the past 12 months. In most if not all of the areas the consultative council reports have since been produced as separate documents, and consumers have been invited to apply for copies, but it is doubtful whether the work these bodies do quite voluntarily—except in the case of the chairman, who is paid as a part-time member of the gas board—gets the publicity it deserves. This reflection is prompted by the remarks of the Lord Mayor of Portsmouth who, in welcoming the Southern Council to a civic luncheon, said that but for his personal friendship with the chairman he would not have known where to go, other than the local showroom, to exchange information between the Gas Board as producer and himself as consumer.

In some areas, North Thames for example, information about the functions and names and addresses of local members of the council is displayed in every showroom and in as many other places of public resort as possible, and in others any expenditure on publicising such information is condemned, generally by politicians, as wasteful extravagance. The creation of the consultative councils in 1949 was part of a new and untried experiment in producer-consumer relationships in a nationalised public utility industry, and it is only now, after five years experience, that the public are beginning to recognise the consultative councils as an economic stabiliser, a medium not merely for assuring attention to consumers' complaints (which in 99% of cases are more expeditiously dealt with over the showroom counter) but for interpreting the technical and financial affairs of the gas board to the man in the street and for informing the gas board of the consumer's reactions to present service and his ideas for further improvement combined with the lowest possible charges for all that he receives from the board.

Over the first five years we have reported a good many meetings of the consultative councils and we have felt increasingly that producer and consumer have learnt a good deal more about each other than they knew under private ownership. There have been some criticisms, some of which have implied that the chairmen and secretaries, because of the conditions of their appointments, tend to restrict the potential scope of the activities and usefulness of the councils; others have suggested that insufficient use is made of local authorities as bodies representative of consumers; and others that it is desirable to merge gas and electricity consumer representation. Lengthening experience has served to iron out most of such criticisms, and on the whole the paid as well as the unpaid participants in the set-up have been found to be doing a useful and hitherto unrehearsed job of work extremely well.

We are not at all sure that the age limit, under which the Minister of Fuel and Power has already 'retired' three of the ablest gas consultative council chairmen in the country, is an unmixed blessing, although in fairness to their successors it must be said that those who preside over all the 12 councils exhibit a sense of fairness and responsibility which is to be admired. The fact that most of the appointments for which the Minister is himself responsible have been renewed for further terms is evidence that the work has been done at least to his satisfaction, and those who, in consequence of resignations and retirements, have been promoted to the office of deputy chairman are upholding the tradition established by the first occupants of those offices. During the year ended last March, 11 chairmen and 12 deputy chairmen reached the end of the periods for which they had been appointed; the Minister reappointed 10 chairmen and eight deputy chairmen, and made fresh appointments in the remaining cases.

One very useful development since the earlier formative years has been the introduction of a periodical meeting of the Minister with the chairmen— and latterly the deputy chairmen too—of the councils to discuss with them possible measures for improving the general effectiveness of the councils, and in particular, for ensuring proper consideration of the needs of industry. At a meeting recorded in the Minister's own report experts on public relations gave advice to the chairmen on the means by which the councils' work might become more generally known to the public they serve.

Personal

MR. EDWARD C. LEJEUNE, M.S.E., A.SOC.C.E. (France), was elected a Vice-President of the Society of Engineers at the annual general meeting of the Society at Westminster on December 13.

MR. T. J. WILLIAMS will cease to represent Smith Meters, Ltd., in Wales from January 1. MR. W. W. TAYLOR, who is well known to the gas industry in Wales, will take over this territory in addition to his present duties.

MR. R. A. LAKE, formerly assistant chief engineer of the iron and steel development department of Stewarts and Lloyds, Ltd., has been appointed Chief Engineer designate of the Redbourn section, Scunthorpe, of Richard Thomas & Baldwins, Ltd.

Obituary

MR. HAROLD C. MANN, M.I.MECH.E., M.INST.GAS E., Senior Technical Representative of the Heavy Construction Department of Newton, Chambers & Co., Ltd., died in St. Thomas's Hospital, London, on December 5, following a heart attack on Waterloo Station on November 23, when on his way to attend the autumn research meeting of the Institution of Gas Engineers. He was 61. Mr. Mann served an articled apprenticeship with the Gas Light and Coke Company, at Beckton and Fulham Works, and in the 1914-18 war was in the Royal Engineers. He joined Chemical Engineering Wiltons, Ltd., in 1912, returning to them on instructions from the War Office for special duties in 1916. He served that company progressively from the position of Chemical Engineer to Technical Director for upwards of 30 years. He joined Newton Chambers in February, 1945, for the special purpose of developing the design and sale of continuous tar distillation plant, and has represented the heavy construction department in London and the South Eastern areas since that time, specialising more particularly in gasworks plant, chemicals plant and distillation plant.

Miss Burgess's Successful Tour

Miss Lovell Burgess, Lectures Officer of the Gas Council, has just completed a tour of Liverpool and Manchester where, by invitation of the North Western Gas Board, she successfully lectured on various subjects with a direct bearing on the gas industry.

In Liverpool she addressed students of the F. L. Calder College of Domestic Science, the Liverpool Branch of the Women's Gas Federation, and the Liverpool Townswomen's Guild.

In Manchester her talk was to students of the Manchester Domestic and Trades College.

Diary

Dec. 18.—WALES AND MON. JUNIORS (SOUTH): Short Papers, Pontypool.

Dec. 30.—NORTH THAMES G.C.C.: Westminster City Hall, Charing Cross Road, London, W.C.2.

Jan. 4.—MIDLAND JUNIORS: 'Some Functions of a Coal Test Works,' G. E. Brooke. Birmingham.

Jan. 4.—EAST MIDLANDS G.C.C.: Victoria Station Hotel, Nottingham. 11.30 a.m.

Jan. 7.—LONDON JUNIORS: 'International Gasworks Practice,' J. D. Grant. 178, Edgware Road, London, W.2, 6.30 p.m.

Jan. 7.—WALES G.C.C.: Shire Hall, Shrewsbury, 2.30 p.m.

Jan. 8.—SCOTTISH JUNIORS (EASTERN): Short Paper Day. Dundee.

Jan. 12.—MANCHESTER JUNIORS: Short paper for 'F. Johnston' prize. Manchester Demonstration Theatre.

Jan. 14.—SCOTTISH JUNIORS (Western District): 'Letting Steam Off,' J. R. MacOwen. 522, Sauchiehall Street, Glasgow, C.2. 6 p.m.

Jan. 15.—YORKSHIRE JUNIORS: 'Coke—The Smokeless Fuel,' W. I. Ineson. Harrogate.

The Institute of General Managers

It has been announced that the first Vice-Presidents of this Institute are His Grace The Duke of Rutland, and Sir Rupert De la Bere, Bt., K.C.V.O., K.St.J., J.P., M.P. His Grace is a director of Royal Exchange Assurance and other companies. Sir Rupert was Coronation Lord Mayor of London and has been a Member of Parliament since 1935. He is a Managing Director of Proprietors of Hay's Wharf, Ltd., and other companies. Sir Rupert is also Alderman of the City of London for the Ward of Tower.

Over 150 members and guests attended the First Annual Dinner of the Institute which was held in London on December 3. At this function the Rt. Hon. The Lord Balfour of Inchrye, P.C., M.C., and Sir Rupert De la Bere, who presided, were the principal speakers. In the past year the foundations of the Institute have been laid and the development of the Institute as essentially a British Commonwealth Organisation, whose branches will form a network for virile interchange of management opinions, bringing with them practical solutions to the current problems of higher management, has begun.

Mr. Gerald Nabarro, Conservative M.P. for Kidderminster, who last week drew first place in the ballot for Private Members' Bills in the House of Commons, is to introduce a Clean Air Bill to implement the main recommendations of the Beaver Committee on Air Pollution. The Bill is to be presented today. It will come up for second reading in the Commons on February 4.

Balfour Lecocq, Ltd., have transferred their offices from Leven, Fife, to Leeds in order to be closer to the main fields of their activities in the coking and chemical engineering industries. The new address is 57, The Headrow, Leeds, 1 (T/N Leeds 2-8461; T/A Balcoke, Leeds, 1). Although Balfour Lecocq, Ltd., are now based on Leeds, they are still in close contact with Henry Balfour & Co., Ltd., of Leven, who are with Les Fours Lecocq S.A. of Brussels, joint owners of Balfour Lecocq, Ltd.

Commencing soon after Christmas the Northampton Polytechnic Department of Applied Chemistry, London, E.C.1, is offering two lecture courses. The first concerns the properties and utilisation of liquid fuels, the other deals with recent developments in metal finishing.

The Northern Gas Board has carried out further tests with its overhead street heating apparatus intended for installation outside shop windows. Several large stores in the city are interested in the scheme. The Board states that a great deal of work has gone into improving its protection against wind, but it would be folly to say that the apparatus would stand up to any circumstances.

Mr. E. Avison (Chief Sanitary Inspector, Southport) complimented the North Western Gas Board on its attention to matters relating to hygienic standards during discussion at a caterers' conference at Southport on November 27. He said the Board was quick to co-operate with his department. Southport had one of the most modern markets with plentiful supply of hot and cold water, and this would not have been the case had the Board not co-operated. The conference, 'Science and the Caterer,' was sponsored by the Merseyside Industrial Canteen Association, of which Mr. Frank Fisher (Sales and Service Manager, N.W.G.B., Liverpool) is President, and Mr. John Evans.

2,000 Visitors to Flavels

During 1954 no fewer than 2,350 people have visited Sidney Flavel and Co., Ltd., at Eagle Foundry either on organised works visits or sporting functions. The visitors have been members of the Women's Gas Federation, Townswomen's Guilds, Master Gas Fitters' Associations, and Gas Salesmen's Circles from all over the British Isles.

Christmas Holidays.—Our printers will be closed for four days over Christmas, and we would advise our readers and advertisers that, in consequence, the "Gas Journal" and "Gas Service" Offices will close on Friday evening December 24, and re-open on the morning of Wednesday, December 29.

45th Report of the Joint Refractories Committee: 1953-54*

PROFESSOR A. L. ROBERTS, in his opening remarks, said that the aim of the British Ceramic Research Association (B.C.R.A.) was to preserve a proper balance between fundamental investigations and those of a more practical nature. He instanced the field tests on flaking and the temperature surveys of retort settings. Laboratory work on iron spots had been inconclusive; the question whether or not these are deleterious to silica in service could be placed beyond doubt by service trials of retorts built of iron-spotted material. The Gas Council had agreed to support such trials whenever they were ready to undertake them. He thanked the various Area Boards and their personnel for their assistance and collaboration in the work of the B.C.R.A. Dr. Green, Dr. Rigby and their colleagues were to be congratulated on their work. The recent revision of the specifications for refractory materials had given them much extra work. During this period Dr. Green had had to leave them for a time on account of illness; all members were glad to see him restored to health and back with them again. **Dr. Rigby** then presented the Report, of which we give the following abstract:—

Among the more practical investigations is the Paper entitled 'The Flaking of Continuous Vertical Retorts—Works' Experiments.' This describes the performance of panels of three different types of silica brick built into continuous vertical retorts at three different plants. At all these plants the experiments have now run their course. Although the bricks are made from raw materials taken from widely different parts of the earth's crust, this is irrelevant. What is important is that in every case that fired material possessing the lowest porosity and permeability gave the lowest incidence of flaking. It seems clear that a considerable improvement in flaking resistance might be effected if the apparent porosity of silica material for the carbonizing industry could be reduced to a figure round or below 18%. This goal is not an easy one to attain, but laboratory researches have indicated some ways in which porosity and permeability can be reduced. One possible approach forms the basis of the second paper, entitled 'Silica Bricks for the Carbonizing Industry—Experiments on Blending Silica Raw Materials.'

The paper on iron spots in silica bricks is a topical one in view of the continued shortage of first-quality raw material for the silica brick industry. The problem is a thorny one both for the manufacturer and the user, particularly as rejection of iron-spotted material is not at the moment based on sound scientific grounds. Both manufacturer and user are agreed that an investigation to ascertain the effect of iron spots on the durability of silica material for the carbonizing industry is long overdue.

A paper of practical interest to the gas industry is the description of the results obtained from the temperature surveys carried out during the heating-up period of two different retort settings. During the past year much time has been devoted to recording a vast amount of temperature data from these two installations. One survey has now been completed and records are available during the first six months of gas making. In the next few months, it is hoped also to have completed the data for the second installation. Such a vast amount of material required long and careful analysis. It has been decided to limit the presentation in this year's Report to temperature data relating to the heating-up period, which are now complete for both settings, and to reserve the fuller investigation relating to the gas-making period for next year's Communication.

Research of a more academic nature, but nevertheless having a topical interest, is discussed in the paper entitled 'Reproducibility of Reheating Tests on Firebricks,' describing results obtained on the after-contraction test. The present data go some way towards establishing reasons for variations among different laboratories.

Finally, the reader's attention might be drawn towards two other investigations, essentially of a long-term nature, that are nevertheless producing results of great interest both to the brickmaker and user. First, there is the investigation now being carried out in which a sonic method is used to measure modulus of elasticity at temperatures up to 1,200°C.

The second investigation that is making important contributions to our knowledge of silica materials is the work on quartz conversion which is being carried out at the University of Leeds.

Flaking of Continuous Vertical Retorts

(J. Laming, G. R. Rigby)

The experiments here reported were prompted by observations that flaking was not an important cause of deterioration of continuous verticals built in France, and that silica materials available in South Africa produced bricks of exceptionally low porosity and permeability. Materials of these two kinds, silica bricks of medium porosity and very low permeability made in France from Belgian quartzites, and others made from South African 'Silcrete,' were built into working retorts in the flaking zone and compared with retorts built throughout of normal British silica. The true porosity of the British materials was round about 30% with permeability ranging from 0.13 to 0.17, that of the French material 23.3 to 26.2% with permeability 0.013 to 0.042, and of the South African 16.4 to 16.9% and 0.026 to 0.029. In the main test the retorts were W.D. 52 in. and they were let down for cold examination after 3½ years' working.

The results of these experiments indicate very clearly 'that, under severe flaky conditions, the resistance of these' (French and South African) 'materials may have been almost double that of' the British material. The low porosity and therefore high bulk density of the two foreign materials suggests that their mechanical strength at working temperatures might be appreciably higher than that of the indigenous material and this factor may also have an important bearing on their resistance to flaking.

Silica Bricks for the Carbonising Industry

This report of experiments on blending silica raw materials is a continuation of G.C.6, 1952, in which the authors, J. Laming and G. R. Rigby reported on the relation between the properties of raw quartzites and those of the silica bricks made from them, showing that bricks of lower porosity and lower permeability could be made from quartzites with a small crystal size.

In the experiments now reported three raw materials were investigated: a high-grade quartzite of low alumina, but high iron content, a quartzite of high alumina content and a glass-making sand of high purity. 'When examinued microscopically, all three raw materials were seen to consist of well-defined quartz crystals of 0.10 to 0.20 mm. dia., though a very small proportion of crypto crystalline silica was present in' the first. They were mixed in several combinations, two in each, and fired in a silica-brick kiln. The grading adopted was, roughly, 55% coarse to 45% fine fraction.

The result was not conclusive. It was not possible to detect any decisive effect on porosity and permeability. 'The refractoriness under load of the silica bricks was found to be more dependent on the quality of the fine fraction than on that of the coarse fraction.'

Iron Spots in Silica Bricks

(J. Laming and G. R. Rigby)

'Iron spots are caused by local concentrations of iron and cannot be removed by reheating.' Little is known about the effects of iron spots on the durability of silica work but iron spotted bricks are viewed with disfavour by the gas industry and the total rejectlons made by manufacturers and

* Presented to the Autumn Research Meeting of the Institution of Gas Engineers (G.C.16).

sers together may be between 2 and 10 per cent. It is ear that these rejections, 'even if made by the brick maker, ust not only increase the cost of the product, but also result in an appreciable wastage of high-grade quartzite.'

Investigations in the laboratory showed that the iron ontent of the spot is very low. 'A surprisingly small amount f iron will result in a spot large enough to warrant rejection ccording to existing standards'; 30 mg gives rise to a pot ¼" dia. But 'there is no evidence that iron spots are eleterious in service. The next phase of the laboratory ork will, therefore, be concerned with the effects of iron pots on durability, and in this connection a trial in which on-spotted bricks are built into retort settings would be of reat value.'

Reproducibility of Reheating Tests in Firebricks

(J. F. Clements)

'After some 40 years of constant industrial use—the Permanent Linear Change (P.L.C.) Test for firebricks continue o give trouble to manufacturers and users. This paper gives n account of recent investigations of anomalous results and concludes with an attempt to summarize our knowledge of the reheat test in its application to firebricks.'

It analyses the causes of the different results obtained in different laboratories showing these may be affected by small variations in the conditions of the test. The development and value of the after-contraction test for fire brick, its functions and limitations, are discussed. 'The most sensible view of the after-contraction test in present circumstances is to regard it simply as a numerical indicator of possible change in a known material.' It would be unwise to attach physical meaning to the figures obtained which 'can be very misleading because of the variety of ways in which firebricks can behave in the test.'

Further Temperature Surveys in Continuous Vertical Retorts

(J. Laming)

Thermocouples were inserted into retorts at different levels and observations made during the heating-up period. At Works No. 1 the retorts were (obviously) WD82 in. and at Works No. 2 (equally obviously) G.W. 40 in.

At Works No. 1 the observation points were (in plan) in one long wall and at the end, and at three levels, 3 ft., 8 ft., and 16 ft. from the top; at Works No. 2, at one end of the minor axis and 'at the centre of the block separating the retorts,' and at the levels 4 ft., 9 ft., and 19 ft. from the top. The construction and operation of the thermo-couples are described. The observations are graphed. Vertical thermal expansion of the retorts was also observed.

The conclusions drawn are, that during the heating-up period only:

(1) In both types of retort, there was evidence of appreciable heat transfer by convection from botton to top of the retorts.

(2) At Works No. 1, though the end walls of the retort receive heat by conduction from the side walls, 'it is probable that a considerable proportion of the total heat flow is in the form of radiation and convection.'

(3) In both types of retort, large differences in temperature at any given level were observed. These differences, which occur in the range of silica inversions, could give rise to differential expansion tending to break the bond between brick and cement in the horizontal joints near the end wall of the retorts.'

Progress Report of Other Investigations

1. *Flaking of continuous verticals and sillimanite.*

Trials with sillimanite built into the flaking zone of two retorts in the North Thames Area have proved, after two years working, that this material is not very successful. The sillimanite walls were markedly bowed making it difficult to estimate flaking loss with certainty. But 'it would appear that rather less flaking had occurred . . . although it was observed that incipient flakes, still adhering to the bricks, were thicker in the case of sillimanite than with silica.' Samples of the two used materials are now being examined in the laboratory.

2(a). *Flaking in Horizontal Retorts*

Samples of used silica brickwork taken from a horizontal retort are found to present an appearance typical of flaking. This is thought to be connected with the free space above the charge where conditions may resemble those in a continuous vertical.

(b). *Examination of Scottish Retorts*

An inspection has been made at two Scottish works where continuous verticals had been let down for repair after 12 years and 17 years continuous operation using Scottish coals of the feebly caking low-swelling type. Samples of used material have been received for laboratory examination. Factors affecting the longer life of retorts in Scotland are briefly discussed.

(c). *Durability of Refractories in Continuous Vertical Retorts*

An experiment is reported in 4 benches each of 24 retorts in course of construction at a W. Midlands works. Each bench is built with a different brand of material, three of silica and one siliceous. The B.C.R.A. has been invited to follow the progress of the retorts throughout their working life.

3. *Temperature Surveys at two Gasworks*

It is hoped to obtain records of at least 6 months' operation during surveys at two works of the N. Thames Board. Records have already shown that at 17 ft. from the top of the retort, with a carbonizing face temperature in excess of 1,100°C., the temperature at the centre of the charge rarely rose above 200°C., suggesting that the limiting rate of carbonization depends more on the effective conductivity of the charge but on the conductivity of the retort wall.

4. *The Determination of Young's Modulus at Various Temperatures*

A sonic method has been used to determine the Young's Modulus of refractory materials between 20 and 1,000°C. The method has been applied to two silica bricks, one siliceous and a number of fireclay bricks with varying alumina content. The general trend in all cases is towards an increase in Y.M. with increasing temperature, differing with the amount of free quartz. 'Whereas a well-converted silica brick was only 20% stronger at 1,000°C. than at room temperature, the strength of the siliceous specimen had increased by 150%. This increase in strength must occur through a tightening up of the structure, and it is possible that porosity and permeability are also reduced as the temperature is increased'.

5, 6 and 7. Report, briefly, work on 'A Rapid Method for the Measurement of Thermal Conductivity', 'An Examination of the Refractoriness-under-Load Test' and on Clay-Quartz Relationships. No. 6 reports that this work is now under the supervision of a newly formed Refractoriness-under-Load Sub-Committee of B.C.R.A.

DISCUSSION

Dr. A. E. Haffner (North Thames Gas Board): A year ago when the 44th Report was presented, I was eager to know what conclusions had been reached in respect of the comparative flaking tests of silica materials of three different origins, and now the interesting results have been presented. If the loss of silica is expressed in cubic inches per 1,000 tons of coal carbonised, the loss in the British retorts was 430 cu. in. per 1,000 tons of coal and for the French, 260 cu. in. The calorific value would be about 500 B.Th.U. per cu.ft. We are experiencing losses of 1,000 cu. in. per 1,000 tons of coal where the calorific value is of the order of 530 B.Th.U. per cu.ft. At 450 B.Th.U., which may be typical of many Scottish conditions, the loss due to flaking would be expected to be very small, perhaps, even at 100 cu. in., and it would be very interesting to have data of such sort. It is good to note that Mr. Laming is likely to report upon Scottish installations.

In the meantime it should not be overlooked that in siliceous continuous vertical retorts, at least when carbonising Durham coals, the loss of brickwork in the flaking zone is extremely low, lower than for French or South African silica. This desirable quality is, however, offset by its vulnerability to ash attack. But it would be interesting to have Mr. Laming's views on the flaking resistance of siliceous material which operates at equally high temperatures and does not have a low porosity.

The Report makes reference to the trial of sillimanite in the flaking zone of two retorts, but after 523 days the material had deteriorated more seriously than silica. This was disappointing after the material had seemed so well to comply in respect of similarity to carbon in expansion coefficient. To

this had been attributed the freedom from flaking of sillimanite under laboratory conditions. Although it failed in a works test, there are one or two points of interest to be salvaged from the wreckage.

First, the sillimanite failed by deep fissuring rather than thin flaking. The mechanism of its failure has still to be explained, and Mr. Laming indicated that more tests are to be applied to the samples. He has referred to pyro plasticity but the sillimanite which formed the back walls of the combustion flues and was therefore hotter than the retort face had shown no sign of deterioration by shrinkage, fissuring or deformation. Furthermore, the jointing material had remained in perfect condition. It was also interesting to observe that the sliding joint between sillimanite and silica had remained sound although exposed to severe conditions.

There may be found a refractory of lower refractoriness than silica but with higher flaking resistance. Such a material is likely to have a similar expansion characteristic to carbon. This material used on the retort proper where average temperatures are lower due to the heat flow would be compatible with sillimanite which has now been shown to be sound in the back wall which is at maximum temperature. There is now under trial a retort with a combination of sillimanite back wall and 50% alumina retort face, which is a material too low in refractoriness to be trusted to the back wall. To provide information on the flaking resistance of materials of extremely low porosity there will be incorporated specimens of an electrocast material. There will also be introduced a panel of a bondless sillimanite cut to shape from solid rock and unfired, in the belief that the sillimanite failed because of the attack on its bond. The electrocast material and the solid sillimanite are quite outside the practical price range but are included to test the importance of porosity.

To take the Silcrete trials further, there have been constructed two 103 in. retorts with the flaking zones built in Silcrete, and the conditions of operation are known to be associated with severe flaking. The importance of low porosity will thus be tested more searchingly. These are materials which are immediately available, but it is good to know that Dr. Rigby is devoting attention to the possibility of blending materials to produce low porosity silica, and there is no doubt that manufacturers will become more and more interested in the commercial production by one means or another of low porosity silica as the various trials clearly establish the importance of this property.

The temperature surveys in the vertical retort show that with the best will in the world heating-up is still a dangerous phase in the life of settings. The importance of uniform heating emphasises the need to design settings with a maximum degree of symmetry and simplicity in respect of structure and heating system.

Mr. R. O. Richards (Woodall-Duckham Construction Company, Ltd.): A substantial part of this year's Rerfractories Report is devoted to the very practical problem of flaking in vertical retorts, and it is on this subject that I should like to comment briefly. It is very gratifying to us on the contracting side of the industry that Dr. Green and his staff have taken such an interest in this problem which we have always felt to be one of the few weak points of the continuous vertical as we know it today, and it is particularly pleasing that the results of the full-scale works trials which are presented in this Report seem to give a positive lead as to the direction in which the answer lies. It is, nevertheless, sobering to reflect on the length of time required to bring full-scale experimental work of this kind to fruition, for it was no less than seven years ago when inspecting retorts on the Continent after the war that the impression was originally gained that flaking of the top of the silica zone on French verticals was not usually the determining factor in ending the life of a retort. We were somewhat cautious at the time about attributing this apparent freedom from flaking to the quality of the silica, knowing that much heavier steaming was normally practised in France than in this country, but we felt that the indications were, at any rate, strong enough to warrant a comparative trial of low porosity silica over here.

This research effort in overcoming flaking has been directed not only to finding an improved form of silica but also to trying out alternative refractories, so it is most disappointing that the experiment with sillimanite in the North Thames area has proved a failure. This is not the first time that sillimanite has been tried out in continuous verticals; twenty-five years ago my Company built some retorts in this material in the hope of overcoming flaking troubles, and although they appeared not to flake in the same way that silica does, the sillimanite eventually failed due to cracks parallel to the working face which resulted in large pieces coming away. When the idea of trying out sillimanite in continuous verticals was recently revived, we hoped that the improved methods of manufacture now used would overcome this trouble, but unfortunately this has not proved to be the case, and virtually the same form of damage has recurred.

It is much to be hoped that the B.C.R.A. will persevere with their work on blending silica rocks. It would be interesting to hear from them whether they have any other ideas for tackling the problem, such as a surface coating process designed to reduce the porosity of the working face of the brick.

Mr. J. Sharp Smith (North Thames Gas Board): As Professor Roberts has said, the section of this report which deals with the after contraction, or permanent linear change, test, is particularly useful as it comes at a time when the gas industry is adopting a new specification for refractory materials. The use of this specification will mean that more attention will be given to the quality of the materials, and it is probable that the after contraction test will become generally used throughout the industry. Section 3 of the paper by Mr. Clements which forms Part V of the Report should, therefore, be studied by all those who are making this test.

Mr. Clements is quite right in bringing before us the limitations of the test, and it is to be hoped that he will continue his critical survey of it until he has been able to devise another test which will measure the degree of firing but which will not be influenced by any of the other properties of the brick. The test as it now is, does undoubtedly serve a useful purpose, and if intelligently used can give some valuable information about the characteristics of fireclays. I believe that our suppliers of firebrick are paying more attention to this test and I hope that the day is not far distant when we shall no longer be pressed to take doubtful consignments solely on the reputation of the manufacturer.

I would like to say a little about iron spots. I think that some mention should be made of the discoloration which may occur by contamination from fly ash; this is quite different in appearance from either mottling or iron spots. If iron spots are due in the main to tramp iron, why does steel works silica get more of them? Can Dr. Rigby tell us if the reaction in the iron spot zone is completed in the kilning of the silica or will it continue in service? If it is complete, will it recommence if, in service, the cavity in the spot becomes filled with ferruginous ash?

Mr. S. J. Beale (The Derbyshire Silica Firebrick Company, Ltd., Hartington): My remarks today are concerned mainly with the report as reviewed by the manufacturer of refractories.

Turning to those papers of direct influence on manufacturing processes, that on the blending of silica raw materials is a useful first step which has shown one possible method of conserving the high quality stone, but in view of the limited nature of the conclusions to be drawn from this work, it is strongly urged that further work, on a somewhat larger scale, should be carried out on silica rocks of more varied physical properties. Also, that gradings should be included which are not the 'gap' type in order to lessen probable wastage. Many manufacturers of silica bricks will echo the comment in the general introduction that the investigation on iron spots in silica bricks is long overdue.

The gas industry will find it necessary to build some retorts of materials containing iron spots in considerable excess of those now permitted, in order to finalise the issue. I urge that plans be made to do this well before the preliminary laboratory investigations are completed in order that the final answer may be known as soon as possible.

Once again a very valuable and thought provoking paper is presented on the permanent linear change test for firebricks. The effect of slight variations in atmosphere on the results obtained is striking, and is worthy of special attention by all concerned with testing such materials.

The introduction of the Sonic method of determining modulus of elasticity at temperatures up to 1,000 to 1,200°C. level, promises to reveal valuable information on the varia-

t on in strength of the materials as they pass through silica nversion temperatures and the general increase in strength ith rise in temperature. Manufacturers will study the results f this new method of testing for mechanical strength at levated temperatures with great interest, especially in view of s possible guide to improvements in refractories.

So far as the field investigations are concerned, the works aking experiments have been watched with great interest y silica brick manufacturers. It does appear from the experiments that a fairly high porosity silica brick is more prone o flaking than materials of a medium low and very low orosity. There are, however, several brands of British silica ricks used in the carbonising industry for many years which ave porosity characteristics approaching those of the medium ow type. In view of the suggestion in the Sonic test investigation that increase in strength must occur through tightening up of the structure, and that both permeability and porosity may be reduced as the temperature is increased, is it not possible that some method may thus be found of evaluating these properties at operating temperatures from the Sonic data, and thus making an assessment of flaking resistance of retort materials on this basis?

Finally, I would state that no one exceeds the manufacturers in their deep interest in the extensive surveys of temperatures in continuous vertical retorts. All are most anxious to know the temperature conditions to which refractory materials are subjected and commend the care and thoroughness with which the work is being carried out. The results promised for next year will be awaited with great interest.

Mr. P. C. Bishop (Kent County Division, South Eastern Gas Board): In Part VII, under Various Works Investigations, reference is made to flaking in horizontal retorts, and it is suggested that the flaking was due to excessive free space above the charges. I have watched conditions in the retort house mentioned since the early days of this plant, and although we may have committed a number of crimes, I can assure the authors that the use of light charges has not been one of them.

The only reason for the suggestion of excessive free space that I can think of, is the fact that we have had overcracking. We are quite satisfied, however, that this overcracking was due to the very high temperatures needed to carbonise charges in these retorts of 24 in. by 18 in. cross section in 12 hours. The average weight of charge has been 21 cwt., in retorts 24 ft. long, and this does not allow much room for free space. The charging machine is a shot-placer and free space, if any, appears as a valley between the shots. According to the authors' theory, the deterioration should have occurred above these valleys. In fact, as the paper says, deterioration is more general. I would not be so bold as to say that this phenomenon is not flaking, but if it is there must be some other explanation.

The theory which I share with several colleagues is that the discharging operation is responsible not only for breaking segments but also for the more general attack. A similar wasting of the crown of the retort has occurred, I understand, at another works with which I am not directly connected. Here the free space is also very small. It was shown in this case that the wasting was due to erosion by the coal being projected into the retort, because the trouble was overcome by adjusting the angle of projection.

Mr. J. T. Bradshaw (Deputy London Manager of West's Gas Improvement Co., Ltd.) referred to the temperature surveys in continuous vertical retorts. The reversed temperature gradients in the upper zones of the retorts during heating up show clearly how the retort itself acts as a flue for convected currents of warm air. At these levels, the gases in the flues have been scrubbed of much of their heat by the mass of cool brickwork they have traversed, and it is clear from the figures that they act as a cooling medium. At higher temperatures the effects of radiation become more pronounced and considerable amounts of heat are dissipated from within the retorts by the top and bottom fittings.

The suggestion that the temperature gradient reversal which was noticed in the retort walls on one of the works a few hours after coke charging, was caused by internal combustion, is a little disturbing. These were new retorts and it would be thought that any small quantities of air which might find their way in through joints in the bottom castings would be hardly sufficient to maintain combustion at a point as high as the 16 ft. level. If, indeed, combustion did occur, then it is probable that the assumption that this level approximated to the highest temperatures in the retort at any time, is incorrect. Could it not be that there were higher temperatures at a lower point and that the 16 ft. level was being heated internally by the carrier action of the ascending gas stream?

It is, of course, quite impossible to maintain a constant temperature or a constant increase during heating-up. For this reason, it is inadvisable to aim at too low a rate of temperature rise under normal circumstances as, if this is done, then the unavoidable short period fluctuations may well mean that cooling is occurring. If the target rate of rise is sufficiently steep, the variations become merely changes in rate of heating and the danger of cooling is avoided.

Dr. A. T. Green, O.B.E. (Director, British Ceramic Research Association): You have all had the Report and know what it contains, but I think it is very necessary for me, being as it were the titular head of this business, to state that the team we have got together for this work has, during the past two years, done really magnificent work. In refractories it is all right knowing all about it, but that is positively no good in our particular field of investigation. You have got to understand the using industry. You have even to go so far as to understand the colloquialisms used in retort houses because otherwise your success will be negligible. Whatever is said about Mr. Laming, he has certainly understood the vocabularies prevalent in the retort house!

Mr. Laming has perhaps for the first time, or for the first time in a serious way, endeavoured to do work in the direction of weighing up the actions taking place in the retort itself. From my earliest days I was assured that it was necessary to survey not one, but a considerable number of retorts. I think that the temperatures survey is the first real dig in this particular direction and without it work on refractories will be useless.

I want to make another point and it is a point which we can readily overlook. In all our use of refractories there is, and there always will be, a compromise. You are never going to get a perfect refractory which will suit the man in Scotland, the man in London and the man in the Lancashire area, but with the work that is being done, so far as I can see, the relative durability of refractories in the various zones is being definitely and absolutely increased. If that is our attitude of mind and if we remember that we do not live in an age of miracles, I am completely convinced in my own mind that within the next limited length of time the durability of your retorts will increase even more considerably than they have done already. There is only one way to do this and that is by means of a good relationship between manufacturers, users and contractors.

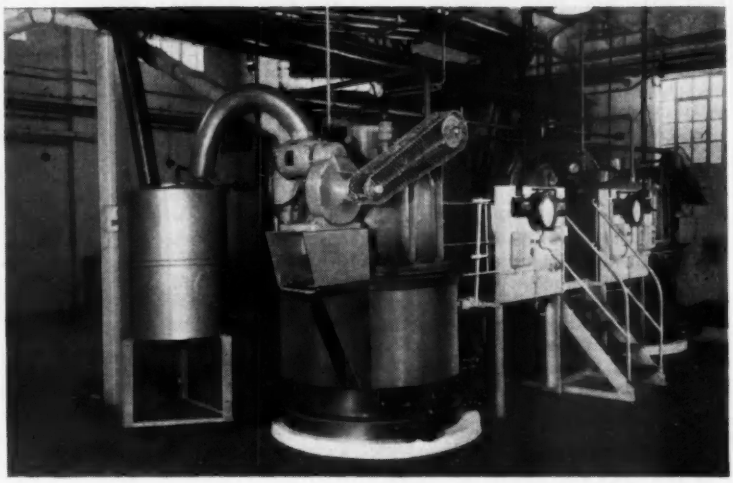
Dr. G. R. Rigby (Superintendent, British Ceramic Research Association): I am sure we wish to thank everyone for their contribution to this discussion. I can assure all the speakers that we have taken a note of all the relevant points. We are particularly pleased to know that Dr. Haffner is trying out new materials in his retorts, but we make one point there and that is to ask him if he will put some of these materials on one side so that we can find out what their properties are. Nothing is more exasperating than to have an excellent refractory or a bad one and to have no materials available to find out why. We are most anxious to test all these refractories, to get as many properties as we possibly can and try to collate the practical results obtained which I think will be of the greatest possible interest to the gas industry.

OPENING OF RESEARCH LABORATORY

The first hydraulic-machinery research laboratory in Britain was opened at East Kilbride, Glasgow, last week. It has been established by the Mechanical Engineering Research Laboratory under the Department of Scientific and Industrial Research. Two sections of the building will be occupied, dealing with problems of oil mechanisms and airflow, but a third section, devoted to model-scale research on water flow, including pump and water-turbine research, will not be ready for some time. The new laboratory will be in the charge of Dr. S. P. Hutton, head of the fluids division of the Mechanical Engineering Research Laboratory. He will have a staff of 27.

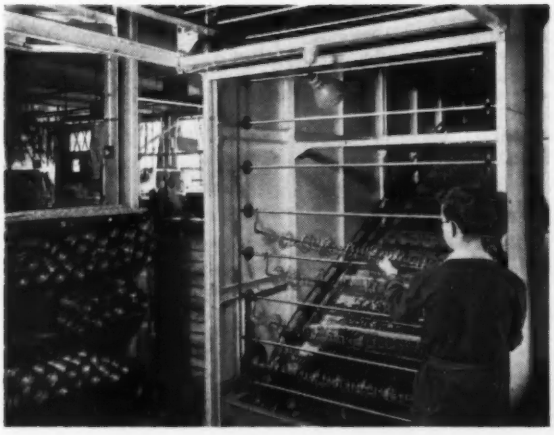
GAS IN INDUSTRY

A brief description is given of the new edition of the popular brochure issued by the Gas Council under this heading.

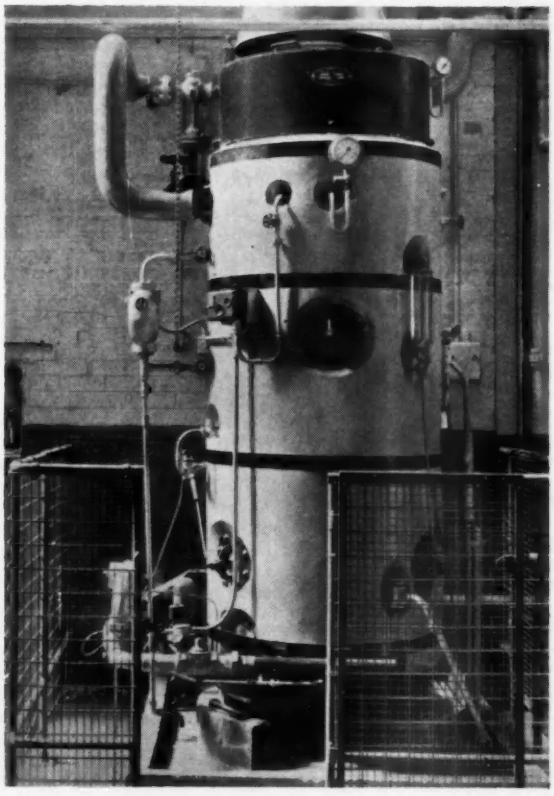


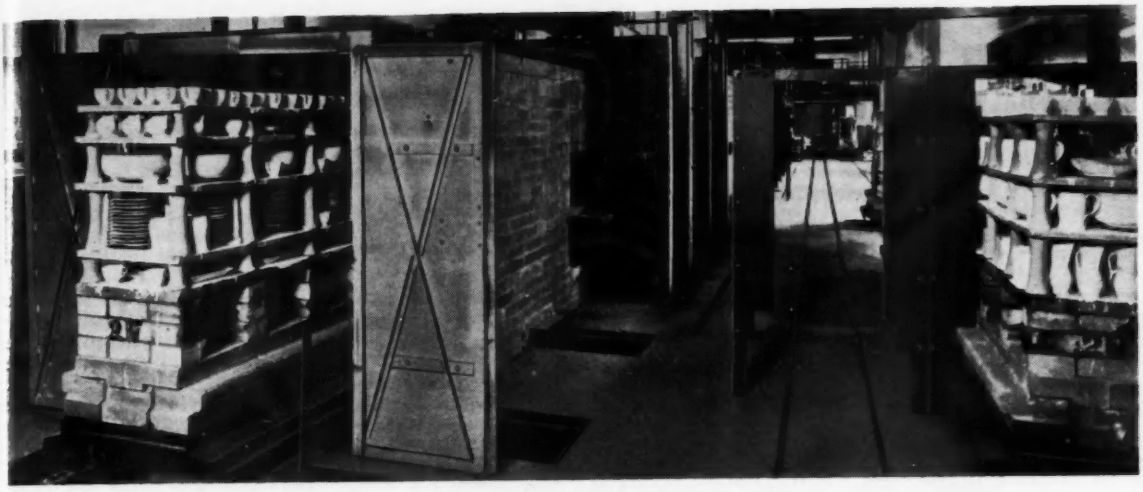
The Gas Council has published a completely new and revised edition of the popular brochure, 'Gas in Industry,' which describes and illustrates some of the more important of the four thousand industrial processes in which gas is used.

The purpose of this publication is to show some of the many ways in which the gas industry is contributing to Britain's industrial needs. It describes how the gas industry recovers most of the heat energy of coal and makes it available to the nation in the form of gas, coke and by-products which provide the raw materials for the manufacture of a host of articles for home and overseas markets. New ways of using gas in industry are constantly being developed and the total number of applications is too extensive to be listed in full in this brochure. Indeed, it is estimated that gas is used in some 4,000 industrial processes. Many interesting examples, however, are given, showing how the application of gas helps the industrialist to improve and speed up



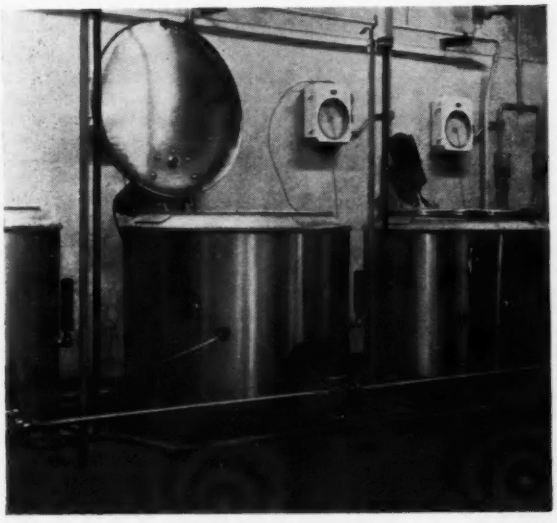
(Above). An installation of gas-fired varnish setting pots.
(Left). 10-ton capacity holding furnace for recovery of cast-iron borings.
(Left below). Continuous gas-fired, radiant heat, drip coating, stoving and annealing plant for furniture springs.
(Below). Gas-fired steam raising boiler supplying two pastry ovens in a modern bakery.





Fully muffled kiln, 126 ft. long, for firing earthenware.

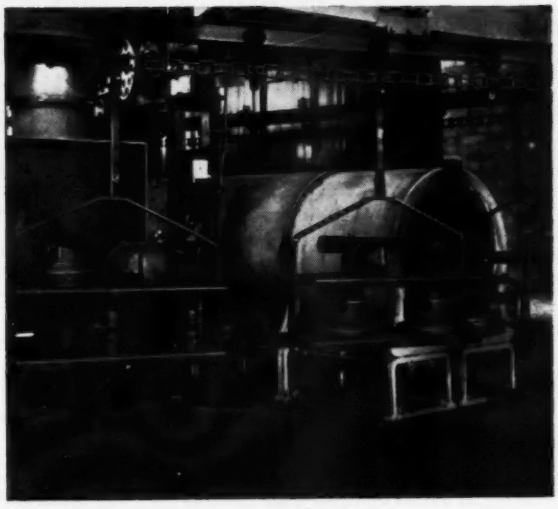
his manufacturing processes and bring down production costs. A number of applications shown in the brochure are illustrated herewith. The advantages of gas for heat treatment processes



A gas-heated pasteurising machine installed in a modern dairy farm.

are recognised by industrialists all over the country. Accurate control of furnace temperature or atmosphere is maintained either by hand or automatically by thermostatic devices; this reduces the risk of spoilage, speeds production, and leads to a higher standard of quality in the product. Gas, as is well-known, is a fuel which requires no storage, and practically no attention; it is smokeless, and thus ensures clean and healthy conditions in workshop and factory. In the light of these advantages, it is small wonder that the industrial demand for gas is expanding. The industrial sales of gas today are over 68% higher than the 1945 sales. Nearly a quarter of all the gas now sold goes to industry. It may be mentioned, for example, that gas consumption for the firing of pottery kilns in the Stoke-on-Trent area has increased four-fold since 1947. In 1932 there was only one gas-fired kiln in Stoke; in 1952 there were 229. Gas is now used extensively throughout the pottery industry at almost every stage from first firing to final glazing. This change-over in the potteries from coal-firing to gas-firing represents a saving to the nation of more than two-thirds of the heat energy of every ton of coal previously used. Other industrial fields in which gas is being increasingly used include continuous-type ovens and furnaces, which have proved of great value in trades ranging from bread and biscuit making to enamelling and curing of painted articles, and a wide variety of heat treatment processes in the heavy engineering trades.

The industrial departments of the individual area gas boards carry out intensive research to develop new methods and processes using gas to its fullest potential. These departments exchange information among themselves and collaborate closely with manufacturers of gas-consuming industrial plant. Their work is co-ordinated through a central information bureau, and the pooled results are made readily available through the boards' industrial gas engineers to industrialists all over the country. Development work of this kind has taken place on gas burners, including the high-intensity type for flame-hardening; brazing and general furnace heating; burners for immersion heating; automatic control of industrial appliances.



Gas-fired radiant heat tunnel for drying foundry black on sand cores.

A new field of industrial usage, to quote one example, has been opened up by the successful application of gas-firing to a shaker hearth furnace for needle hardening. The boards also provide technical assistance in the design of special plant to meet the particular requirements of individual consumers. Operating results of these plants are circulated throughout the gas industry, so that as a whole it is kept up-to-date on the latest developments.

The Gas Council, to whom we are indebted for permission to reproduce the accompanying illustrations, is to be congratulated on the production of an excellent brochure, one that will be of interest to 'gas men' and industrialists alike.

Carburetted Water Gas Cooling and Condensing*

By L. SILVER, B.SC., A.R.C.S., D.I.C., A.R.I.C., M.I.CHEM.E.†

FOR many years the Research Department of the North Thames Gas Board has been making a study of the chemical engineering processes involved in the cooling and condensing of manufactured gas, and the knowledge gained has been applied to the design of new condensing plant to supplement or replace existing plant.

The installation of a very large new carburetted water gas plant at Beckton, which was described by Dr. J. Burns, G.M., in his Chairman's Address to the London and Southern Section of the Institution of Gas Engineers in 1954 ('GAS JOURNAL,' June 2 and June 9, 1954), formed an opportunity to put into practice on a really large scale the principles and methods of design developed from this study of heat and mass transfer in the various condensers that had come under review. The considerations governing the choice and design of this plant are of interest as every unit incorporated some novel features and it has been possible to test the performance of the plant and examine how far the assumptions made in design have been borne out in practice.

The gas-making plant was planned to produce 18 mill. cu.ft. of carburetted water gas per day during the winter months and to provide for a base load of 6 mill. cu.ft. of blue water gas in summer. It was hoped that when the plant was in full operation it might be possible to increase the output during exceptional peak periods to as much as 6 mill. cu.ft. per set or a total of 24 mill. cu.ft. per day.

The gas was expected to leave the wash boxes at a little above 180°F. and to have a water and tar vapour content equivalent to saturation at about 180°F. Calculation showed that a negligible part of the heat content of the gas would be lost in its passage to and from the relief holder, which was to ride on the hot gas main. It was hoped to use part of the heat in the hot gas for preheating water for boiler feed and for lobby heating.

The first unit of the gas cooling plant was, therefore, to be a feed-water heater that would cool the gas by 4 to 6°F. and provide preheat for about 6,000 gal. per hour of softened water.

The remainder of the cooling was to be carried out in two stages—a primary stage in which the temperature would be reduced to 140°F., and a second one in which the final cooling to 60 or 70°F. would be accomplished. The temperature of 140°F. was chosen for the outlet of the primary condensers to ensure that no deposition of solid naphthalene should occur therein, so that no flushing or reversing arrangement would be required for these units, while the gas entering the secondary condensers would still contain sufficient heat and enough tar vapours to melt or dissolve any naphthalene deposits from the cooling gas when the direction of flow in these was reversed.

Feed-water Heater

The duty of the feed-water heater was to heat a relatively small volume of water (6,000 to 7,000 gal. per hour) to as high a temperature as possible, the resultant cooling of the hot gas, which when saturated at this temperature has a very high heat capacity, being only a few degrees. True counter-current working is unnecessary, provided only that the hot water leaves at the gas inlet end of the vessel. In order to obtain reasonable velocities in such a small volume of water, many passes of water tubes are desirable. On the other hand, changes of direction for the very large gas volumes would lead to a very clumsy construction and are unnecessary. The feed-water heater was therefore designed to have a large number of vertical water tubes in multi-pass arrangement, while the gas would pass horizontally through the shell from one side to the other.

The duty for which the feed-water heater was designed was to heat 6,000 gal. of boiler feed water plus 1,000 gal. of water for space heating from 80°F. to 165°F. when treating 750,000 cu.ft. per hour of saturated gas at 180°F. It was estimated that a cooling surface area of about 4,200 sq. ft. would be sufficient. This was to be accommodated in a vessel containing approximately 400 vertical mild steel tubes 20 ft. long × 2 in. outside dia. through which the water would flow in six passes, while the gas space would be undivided so that the gas would flow horizontally from one side to the other over the whole cross-section of the gas chamber. A vessel, rectangular in plan, was envisaged, but the sub-contractors, W. C. Holmes and Co., Ltd., improved on this by submitting a cylindrical vessel 6 ft. in dia. with gas entry and outlet on opposite sides, each consisting of four 30-in. branches. The inlet and outlet mains are 60 in. dia., and a by-pass of the same diameter was provided.

For the primary condensers, alternative types of plant were considered. The choice lay between water-cooled condensers of the vertical water-tube type and horizontal serpentine atmospheric condensers provided with trough distributors for irrigating the exterior of the pipes evenly with water, and similar to those installed at Bromley. The choice fell on the atmospheric type of plant.

The condenser consists of 12 columns of 12-in. bore cast iron pipes, each column being made up of eight substantially horizontal rows 90 ft. long. Return bends connect successive rows in the column. The 12 columns are connected in parallel by 36-in. top and bottom manifolds, and there is a middle 60-in. manifold into which are connected the fourth and fifth row of each column. The inlet main from the feed water heater is 60 in. dia., and the outlet main to the secondary condensers is 48 in. dia. Connecting and by-pass mains are arranged and valved so that the gas may enter the condenser at the middle manifold and pass through it in 24 parallel streams of four rows to the upper and lower manifolds, reuniting in the outlet main.

Alternatively, the gas flow can be either upward or downward in 12 streams of eight rows between the upper and lower manifolds. This arrangement is for summer working on base load, and the condenser used in this way is then sufficient for the complete cooling of the gas, so that the secondary condensers can be by-passed and shut down when repair or overhaul is necessary.

Secondary Condensers

The secondary condensers were to be water-cooled and supplied with water from a forced-draught cooling tower. Experience with both types of water-tube condenser had shown the advantages of vertical water tubes, as compared with the horizontal tubes employed in the battery type of condenser, in respect of the avoidance of corrosion due to entrainment of gases evolved from or carried by the cooling water and the greater accessibility of the interior of the tubes for inspection and cleaning. In the typical counter-current multi-pass vertical tube condenser, the cross-sectional area available for water flow inside the tube is comparable with the area around the tubes through which the gas passes. As the volume of water used is very much less than that of the gas, it is difficult to achieve a reasonably high water velocity even though high velocity may be maintained on the gas side. Also, the transfer coefficients obtained on the gas side with flow parallel to the axis of the tube are much smaller than those for cross-flow. There appeared to be much to be said for a form of condenser that combined the advantages of cross-flow with those of vertical water tubes and high water velocities while

* From a paper presented to the Autumn Research Meeting of the Institution of Gas Engineers on November 23, 1954.

† London Research Station, The Gas Council.

still maintaining substantially counter-current flow. The secondary condensers for this plant were, therefore, designed with vertical multi-pass water tubes and with the gas in horizontal multi-pass cross-flow. By providing two water passes for each gas pass, it was possible to obtain optimum velocity in both fluids.

This type of construction was quite novel at the time, but has since been put on the market by plant constructors.

Like the more conventional type of vertical water tube condenser, each unit consists of a rectangular gas chamber separated from water chambers above and below by tube plates. The vertical water tubes pass through the gas chamber from one tube plate to the other. Division plates in the water chambers constrain the water to flow alternately up and down the tubes in a series of passes. The gas chamber also is subdivided into passes by parallel vertical division plates passing across the width of the condenser. The gasways in these, however, instead of being alternately at the top and bottom, are full-depth narrow openings alternately on either side of the vessel so that the gas passes to and fro across the tubes horizontally.

Two vessels in parallel were provided, each to cool 9 mill. cu.ft. per day from 140°F., saturated with water vapour, to 70°F. when supplied with 12,500 gal. per hour of water at a temperature of 60°F.

Test Results

Two tests were made on the feed-water heater, the first at 24 mill. cu.ft. per day, and the second at the design throughput of 18 mill. cu.ft. per day. From the results, it appears that the heat recovery is less than the designed performance but the unsaturation of the gas makes them not directly comparable. From careful analysis of the data, however, it appears likely that, if gas reached the heater saturated at 180°F., the desired heat transfer would be closely approached.

There was a bigger range of conditions for the tests on the atmospheric condensers. Tests were made (*a*) at about 1 mill. cu.ft. per hour with divided flow through the condenser —*i.e.*, with the gas divided into 24 streams each about 380 ft. long; (*b*) at about 800,000 cu.ft. per hour, also with divided flow; (*c*) at about 500,000 cu.ft. per hour, with downward flow from top to bottom manifold—*i.e.*, in 12 streams each about 760 ft. long; and (*d*) with upward flow at the same rate. No opportunity was found to test at the base load of 6 to 9 mill. cu.ft. per day.

A careful analysis of the results in conjunction with heat balances on the secondary condensers makes it certain that the gas reaches the atmospheric condensers in an unsaturated state and becomes saturated in its passage through the cooling pipes.

At the rated throughput of 18 mill. cu.ft. per day, there is no difficulty in getting well below an outlet temperature of 140°F., and the performance on overload is satisfactory. With straight-through flow, it is difficult to predict what the performance would be with the condensers as sole cooling means for 6 mill. cu.ft. per day, as the throughput of 13 mill. cu.ft. per day in the tests under these conditions was so much higher.

Two tests were made on the secondary condensers, the first at nearly 1 mill. cu.ft. per hour—*i.e.*, an overload of about 30%—and the second at rather more than the rated capacity of 750,000 cu.ft. per hour. The tests were made with the two condensers working in parallel. The test results show that the design performance is surpassed in practice.

Conclusions

Both the plant as a whole and the separate units have functioned satisfactorily under varied load conditions. The atmospheric condensers dissipate the largest proportion of the heat. The effective performance of these depends on the efficiency of the irrigation system, which requires frequent attention to keep the troughs free from dirt and debris and to maintain even and regular flow of water over the pipes. A disadvantage of the plant is the very considerable amount of spray produced by the falling water, which causes general nuisance and drifts on to other plant in the vicinity where it may accelerate corrosion.

The feed water heater, although a small and efficient unit in itself, becomes large and expensive when the necessary 60-in. mains, valves, and by-pass are included.

The secondary condensers with vertical tubes and horizontal gas flow have proved a very satisfactory design for large gas throughputs combining high heat transfer with low resistance to gas flow.

Further Developments

The condensing system for the more recent installation of carburetted water gas plant at Beckton might well be regarded as taking account of all these conclusions although, in fact, it was designed before the above plant had been put to work.

The primary condensers are again designed to cool the gas to 140°F., and are followed by secondary condensers that are duplicates of those described. This time, however, the primary condensers are, like the secondaries, of the multi-pass vertical water-tube, horizontal gas flow type. There are two vessels in parallel, each including, as an integral part of the condenser, a feed-water heating section requiring no additional gas mains and valves.

Since either condenser may be out of action during off-peak periods, a boiler feed-water heating section is included in each although one such section is sufficient for the whole of the water-heating requirements. The arrangement is such that the function of the feed-water heater and the primary condenser are combined so that each operates under suitable conditions without the need for any extra gas mains and valves.

DISCUSSION

Mr. **W. K. Hutchison** (Senior Vice-President of the Institution and Chairman of the South Eastern Gas Board) said that when one recalled the state of uncertainty surrounding everything to do with gas cooling and condensation only 30 years ago, it was remarkable that a plant of this kind and on this scale could now be designed with confidence to give in operation so close an approach to the design figures. Progress in this field was seriously hindered for many years by the deposits of naphthalene and heavy tar which used to result from the efforts to obtain more output per ton by the use of higher carbonising temperatures in partially filled horizontal retorts.

The solution offered by Carpenter, in 1895, of providing reversible valves for condensers was not accepted as widely as it might have been, probably because, even where it was applied, the shape and disposition of the condensers themselves, whether water-cooled or atmospheric, did not always lend themselves to the purpose for which reversal was intended —*i.e.*, to apply heat to melt the naphthalene deposit and hot tar to help to carry it away.

In these circumstances it was natural that gas velocities for long tended to be kept low, on the general ground that the wider the vessel the longer it was likely to take to block up. The introduction of the battery type of condenser, with high velocities on both the gas and the water sides, and with gas passing across the banks of tubes, set a new standard of efficiency. This, as it happened, coincided with a large increase in the number of vertical retort installations, where not only was the heat load on the condensers much greater than it was in the horizontal retorts, but, the gas being relatively free from naphthalene, full advantage could be taken of the higher efficiency of the new design.

In this paper the author put forward a design of water-cooled condenser which appeared to offer all the advantages of high gas and water velocity and of gas flow across the banks of tubes, but with the tubes disposed vertically, so as to avoid the difficulty of cleaning on the water side and to minimise the tendency to corrosion which caused dissatisfaction with the battery type of condenser.

He would like to ask the author's view on the selection of the tubes. It was their experience that in fact a great deal of the difficulty of the battery type of condenser was due to everyone desiring to improve the machine. They had previously had the greatest satisfaction from the good old-fashioned hot-finished hot-rolled tube, but somebody said: 'You want a better tube, a cold-drawn tube, which is a much better engineering job'—and it lasted only a few weeks, whereas the other lasted for many years.

The author might perhaps be encouraged to learn that they were only now, after 47 years, replacing some vertical tubes in some Carpenter type condensers at Vauxhall. These might

have been wrought iron. It is also interesting to know that these very old condensers were, like those now described, laid out in conjunction with forced-draught cooling towers.

Was the author's design satisfactory for the removal of naphthalene depositions? He might have found that with the modern water gas plant operated under controlled conditions there were no naphthalene deposits that need worry one, and he might perhaps persuade his engineers to increase the temperature to prove that point.

The author had explained why he designed for an operating temperature of 140°F. between the primary and secondary sections of the condensing plant. The same temperature was chosen, for similar reasons, in the coke oven plant at East Greenwich, but there the exhausters were interposed between the two sections. The temperature rise through the exhausters was thus disposed of without the necessity for installing final condensers in circumstances where it was difficult to apply the heat necessary to remove naphthalene deposits.

The use of atmospheric condensers as primary condensers would seem to offer little advantage over vertical water-tube condensers in combination with a cooling tower, and the latter offered a more compact and agreeable layout. They had, however, recently confirmed, and would entirely agree with the author, that atmospheric condensers which were really kept clean and were suitably proportioned for their duty formed an efficient and durable piece of plant.

Mr. **K. W. Francombe** (Whessoe, Ltd.), dealing with the boiler-feed heater, said it was interesting to see that, while separate units were necessarily employed in the original scheme, the later scheme provided heaters integral with the primary condensers, no doubt largely on account of the relatively high cost of valves and connections to individual heater units. The system of providing external piping in order to use the ordinary cooling water in the smaller feed water passes when there was no feed to heat, was particularly interesting. The simpler alternative would have been to rate the condensers for the cooling duty when excluding the boiler-feed passes and to let the water 'stew' in these passes when the feed was not required, but he appreciated that there would be certain attendant disadvantages.

Turning to the atmospheric evaporative coolers, good as they were, one could not fail to note that they were not repeated in the later scheme, largely, he gathered, on account of the mist nuisance they created, but possibly owing to ground space requirements. Would Mr. Silver be prepared to contrast the total capital and running charges of the expensive to build but cheap to run atmospherics with the corresponding overall figure for water-tube primaries plus a cooling tower? He would also like to know whether he found wooden distributing troughs sufficiently free from warp under the difficult conditions of operation to justify their use in preference to cast-iron or galvanised steel troughs.

With regard to the cross-flow condensers, both primary and secondary, he was interested to see the 'side-to-side' gas flow adopted. His Company now rarely employed this flow pattern either in cross-flow or parallel-flow vertical tube condensers. With cross-flow of gas they preferred a straight through and return gas pass if connections were to be at one end, or two straight through parallel gas passes, with a narrow return duct between, if the inlet gas connection was required at the opposite end to the outlet. These arrangements reduced the incidence of the uncertainties connected with the gas-flow pattern in the baffle windows, as there were fewer such windows. It also simplified the shell-side tube-flushing arrangements, as the spray pipes, which were necessarily normal to the gas flow, would be shorter. As against this, Mr. Silver's multi-gas passes had the advantage of making the cross-section of the condenser nearer to the economical square form.

He was surprised to see the low gas velocity of 4.3 ft. per sec. chosen for the secondary condensers, this corresponding with a pressure loss of about ¼ in. w.g. Bearing in mind the overload requirement, he should have thought the optimum value would be in the region of 7 ft. per sec. for this duty.

The problems of condenser design, and indeed the cost of the condensers, were minimised when adopting the admirable system widely used by the North Thames Gas Board, but seldom elsewhere, of connecting the C.W.G. relief holder upstream of the condensers, thus avoiding cyclic gas-flow fluctuations in the condensers.

Mr. E. C. J. Reid (Lea Bridge Works, North Thames Gas Board) referred briefly to observations made when carrying out the experimental work associated with Mr. Silver's paper.

Mr. Silver has referred to the method used to obtain true averages when temperatures fluctuate. On the inlet of the feed water heater the temperature was anything between 177°F. and 208°F.; on the outlet between 175°F. and 181°F.; fluctuations at the other test points were very much less. Before testing the atmospheric condenser, attention was given to the irrigation system. Dust and organic growths had accumulated in the troughs and it does seem as if the provision of simply constructed covers over these troughs would greatly reduce the need for maintenance. Also, the use of galvanised iron water feed pipes would do much to prolong their life under the corrosive effect of spray and condensate.

Mr. B. Pollard (W. J. Jenkins and Co., Ltd.) said that his firm was about to build a complete condenser and washing installation of which a horizontal gas flow cooler formed a very important part. The plan form of this cooler was similar to that which Mr. Silver intended to use in his next installation. This zig-zag form comprised three gas passes in plan with vertical tubes, some divided for what they considered to be the correct surface area for the duty which each section had to perform.

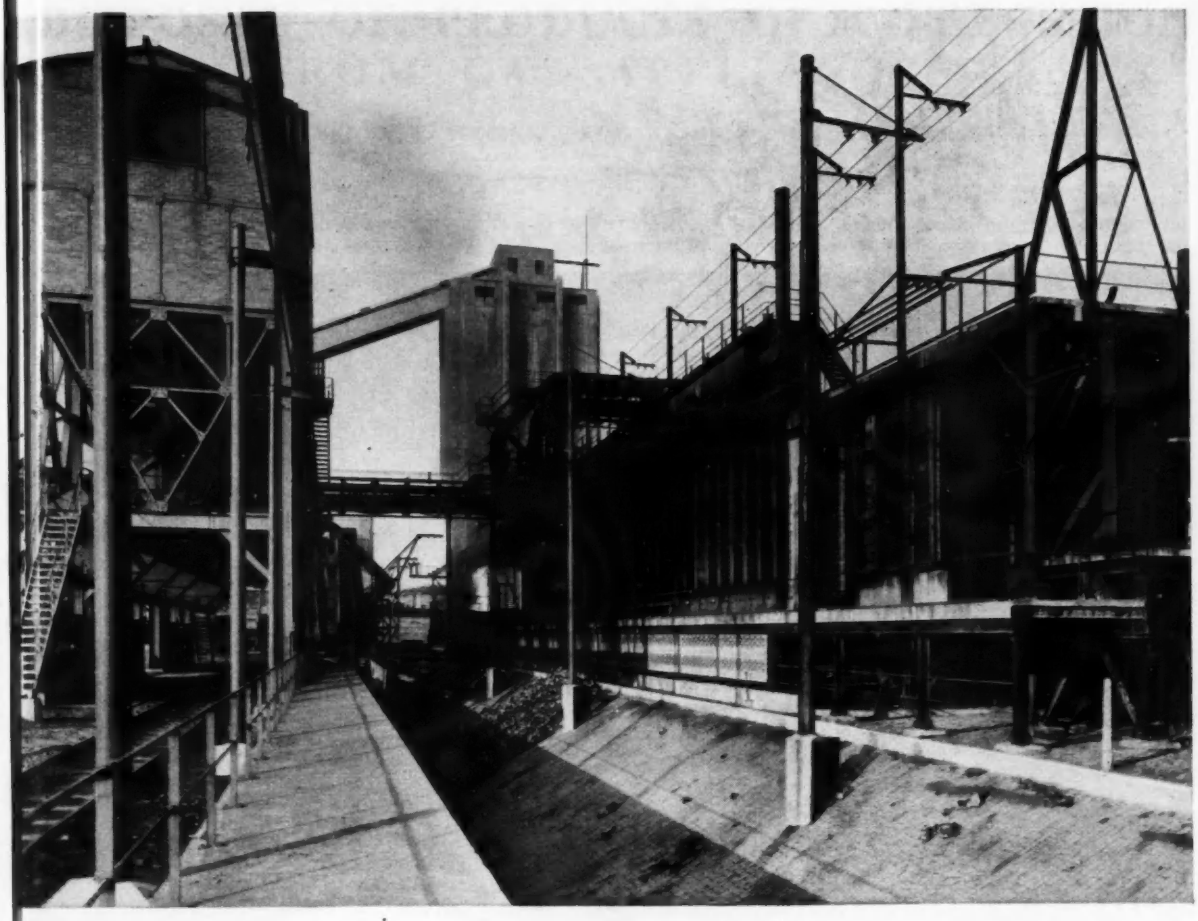
The cooling tower system was used where the main body of water did most of the work in cooling the gas, but, as with most cooling tower performance, they did not get water really cool enough to get the gas rates down, so they used the make-up, as colder water, at the cold gas end. In this particular design they had the main body of water in the cooler at a very high velocity compared with that generally found. The make-up water came in at the cold gas end but was taken out from the cooler round to a section at the end of the cooler, the hot gas end, and was pre-heated for boiler feed. That was fairly straightforward, but one interesting extension of that lay in the fact that the cooling tower pond was to be used as a control for the whole system.

Mr. L. Silver, in reply, said that, in regard to the relative cost of atmospheric and water tube condenser installations, it appeared that when they considered separately the water tube condenser and the cast-iron atmospheric condenser of similar capacity, the water tube condenser was very much cheaper. That was the way the comparison would be made where ample cold water was available at little or no cost. If cooled water was to be obtained from a cooling tower, the atmospheric condenser should be compared with the cost of the water tube condenser, the cooling tower, and circulating pumps; and their experience was that the relative cost was very much the same for both types of installation. It might perhaps be somewhat in favour of the irrigated atmospheric condenser, but there was very little in it. Maintenance costs over a long period would probably be much lower for the cast-iron condenser.

In regard to the ground area, again there was not very much in it if they considered the actual area occupied by the atmospheric condenser and the area occupied by the water tube condenser and the cooling tower. On the other hand, the irrigated atmospheric condenser was not very kind to its neighbours, and it could not be put close to any other plant which might be subject to atmospheric corrosion..

Mr. Francombe had spoken of the advantages of having the relief holder upstream of the condenser. There were disadvantages to be considered also. There was the possibility of emulsion formation and the risk of blockages in the holder mains. Mr. Francombe wondered whether they had any trouble with wooden troughs due to warping when they were alternately dry and wet. Theirs were always at work. The principle of this atmospheric system was the maintenance of continuous irrigation, and they had had no trouble whatever from warping or loss of level.

Mr. Francombe also wondered why they used the zig-zag arrangement of gas flow through the water tube condenser. It was primarily to save steel and to get a smaller and more economic vessel and to eliminate so far as possible the transfer of heat across the division plates. As to gas velocity across the tubes, although that might appear low it would be quite a normal velocity on a battery type of condenser which employed cross flow. A velocity of 4½ ft. per sec. across the tubes gave the same transfer coefficient as a velocity of 15 ft. per sec. parallel to the condenser.



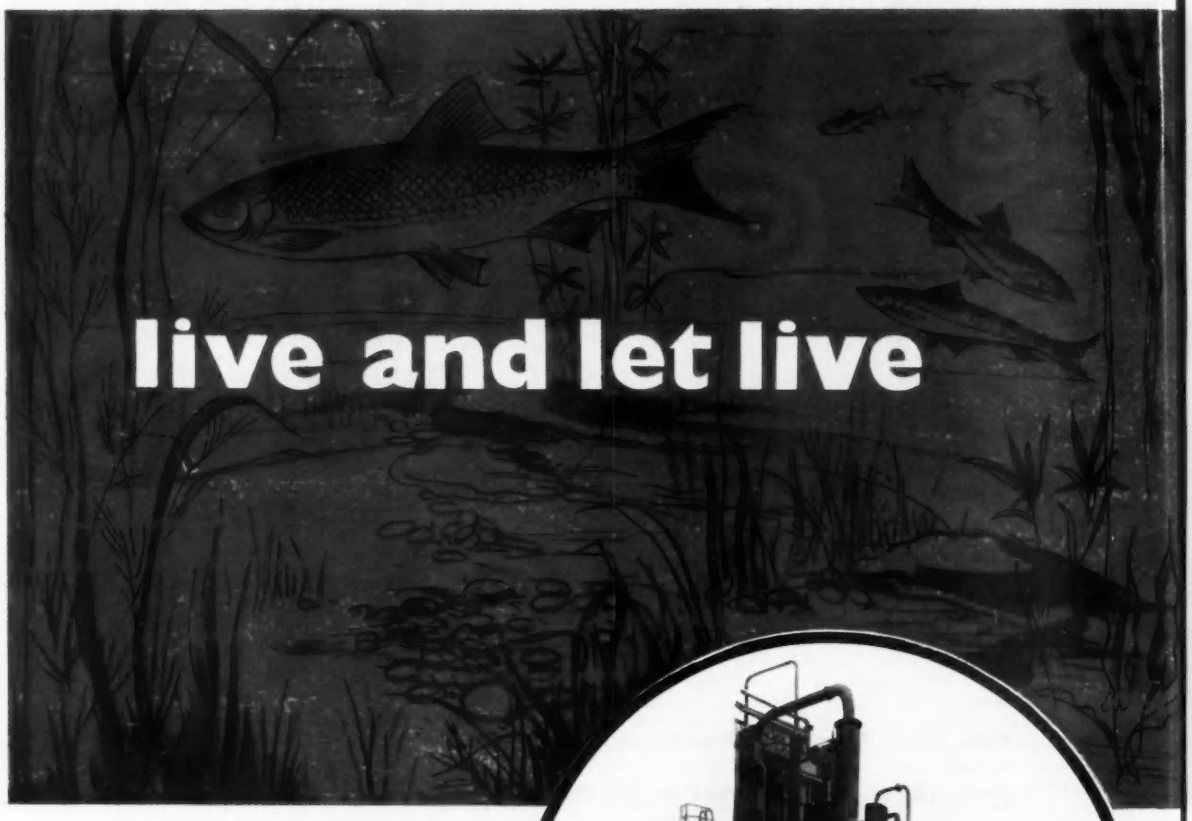
The W-D Becker Combination Underjet Coke Ovens in operation at the Fishburn Carbonisation Plant of the Durham Division of the National Coal Board.

WOODALL-DUCKHAM

CONSTRUCTION COMPANY LTD.

Woodall-Duckham House, 63-77 Brompton Road, London, S.W.3.

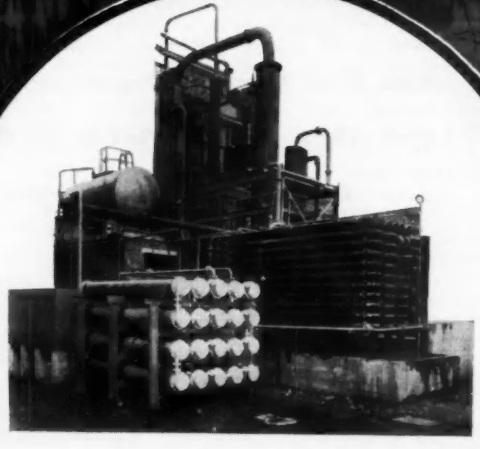
Telegrams: Retortical (Southkens) London. Telephone: KENsington 6355 (10 lines)



River pollution is a menace to the health of human beings and live-stock, to fish and plant life, and to manufacturers and water authorities who rely on clean water supplies.

As specialists in effluent treatment plant, we are now developing new process equipment designed to reduce the toxicity of gasworks effluent to suit local conditions.

If you have an effluent treatment problem send us details of your requirements.



An effluent treatment plant now in operation at a Southern Gas Board works.

Effluent treatment plant by Simon-Carves Ltd

SIMON ENGINEERING GROUP

STOCKPORT, ENGLAND

OVERSEAS COMPANIES | *Simon-Carves (Africa) (Pty) Ltd: Johannesburg* | *Simon-Carves (Australia) Pty Ltd: Syane*

S.C. 109

DISPOSAL OF PRODUCTS OF COMBUSTION FROM GAS APPLIANCES*

By A. R. BENNETT, M.SC., M.INST.GAS E. and H. REICHERT, DR.-ING.†

THERE are two recognized ways of disposing of products of combustion from gas appliances. One either mixes them with the room atmosphere, to a degree of dilution laid down in B.S. Code of Practice 331.104, section 3, paragraph 302, or one passes them into a flue designed in accordance with the other provisions of the same code, and with section 3 of the Domestic Gas Handbook.

Without wishing to belittle in any way the amount of effort and thought that has gone into these excellent documents, or to minimize their great practical value, the authors of this paper felt it might be of interest to approach the subject of products disposal in a rather broader sense, to illustrate and discuss the limitations of the orthodox approach, and to offer one or two original thoughts and experimental results on which, it is hoped, some future progress may be made.

It will be understood that the authors have not aimed at a comprehensive treatment of the subject; quite the contrary. This paper is rather an essay in incompleteness, drawing attention to the breadth of the field for future investigation.

There must be few technical devices so subject to the vagaries of uncontrolled variables as the ordinary household flue. Every flue has its own combination of height, cross-section, bends or offsets, material, state of deterioration, thermal characteristics, susceptibility to wind effects, and degree of sealing of the room with which it communicates. Wide and largely incalculable variations occur and it is not therefore surprising that unsatisfactory flues are not uncommon. There is little doubt that relatively few flues operate at or near the optimum, having regard to both the heat and ventilation requirements of the room to which they are connected.

The principal limitation of flues from a functional standpoint, namely, the very small pressure difference on which they must of necessity operate, is illustrated by figures quoted by Masterman and Noble (Transactions 1931-2). Thus, at an outside air temperature of 60°F. and a flue temperature of 300°F., the pressure difference generated is 0.024 lb. per sq. ft. per ft. height of flue. For comparison, the pressures corresponding to a range of wind velocities are given in the following table:—

Wind velocity (m.p.h.)	...	3	10	20	30
Dynamic head (lb. per sq. ft.)		0.0229	0.255	1.017	2.30

It will be appreciated that, under gale conditions, the dynamic pressure effects can reach a much higher order, being proportional to the square of the velocity, and hence the pressure balance of wind effects between flue inlet and outlet must be of a correspondingly high order if undue fluctuations or possible reversal of flow are to be avoided. In the case of a balanced flue appliance operating on the usual type of wall terminal, the pressure difference available for circulation is limited to about 0.03 lb. per sq. ft. or about 1% of the dynamic pressures set up by quite moderate winds. The need for extremely accurate balancing of inlet and outlet pressures is evident.

The effect on room heating efficiency of excessive chimney flow has been the subject of much comment in recent years, but little effective action has resulted. The gas industry, as supplier of a high-grade and costly fuel, has a particularly strong interest in securing the optimum operating conditions for its appliances and cannot afford to ignore the adverse effects on comfort and heating standards of over-ventilation of rooms.

While a few undertakings have established machinery for dealing with these problems when they arise, there is still widespread indifference to ensuring that flued space heating appliances operate under conditions approaching the optimum. It has been recognized for many years that the fitting of flue restrictors can produce striking improvements in comfort conditions and reduction in the heat requirements of rooms, but the difficulties of assessing the degree of excess flow in particular cases and of selecting the appropriate size of restrictor have tended to limit the use of this highly rewarding approach to the problems of fuel economy. The cost of training and appointing specialists in the areas of undertakings where an extension of the space heating load is contemplated would be amply repaid in improved operating conditions and hence in consumer satisfaction. There is also not the slightest doubt that a determined attack along these lines by the gas industry, and even more by the installers of solid-fuel appliances, could yield by far the biggest return in terms of fuel saving per unit of capital expenditure of any of the alternatives propounded by our fuel economists.

The authors hold the view, with due deference to many members of the Institution who have much good work to their credit in this connection, that many sections of the industry need rousing to their responsibilities and to the realization that the prestige of gas as a fuel, and particularly as a fuel for space heating, has suffered woefully in the past and is continuing to suffer because of the neglect of these and other factors.

The case for the flue would appear to be seriously undermined by the alternative approaches to products disposal now available. It should, however, be remembered that in cases where appliances are operated for long periods so that the whole of the structure approaches thermal equilibrium appreciable quantities of heat can be extracted from the gases by the flue itself, and if the flue is suitably sited (*i.e.*, not on an outside wall) it can make an appreciable contribution to the overall heating efficiency. The flue cannot, however, be credited with any appreciable contribution under conditions of intermittent operation which apply to the great majority of gas space heating appliances to-day, nor can the heat dissipated from water heater flues be counted as useful heat if summer operation is envisaged.

Sulphur Compounds

The general question of the adverse effects of the presence of sulphur compounds in combustion products has been very fully debated in the industry. The relation of sulphur to condensation in fluelessly heated rooms does not, however, appear to have been given the attention it deserves in the official pronouncements on this subject. It is, of course, well known that the presence of sulphur compounds in flue gases can modify substantially the conditions of condensation. The effects of traces of sulphur dioxide and sulphuric anhydride on the dew-point have been investigated by several workers, and it is evident that the removal or substantial reduction of the sulphur content of town gas would appreciably affect the conditions arising when sulphur-bearing products of combustion are diluted to the extent normally encountered in the flueless heating of rooms. In making calculations of flueless heating conditions, it is usual to take the aqueous dew-point as the criterion of condensation. It is important to check the validity of this procedure and to determine to what extent the presence of sulphur in the quantities normally encountered would influence the conditions and hence the maximum rate at which gas can be burned.

While there is some evidence that some constructional materials and furnishings take up a proportion of the sulphur oxides in gaseous products, there are many situations in which this is unlikely to affect the onset of condensation, and, furthermore, it is an effect that is likely to diminish with time so that it seems unsound to place any reliance upon it in dealing with the permissible limits of the flueless use of gas. A further factor tending to lead to underestimates of the

* Abstracted from a paper to the Autumn Research Meeting of the Institution of Gas Engineers in November.

†Research Manager and Research Engineer, respectively, of Radiation Ltd.

severity of condensation is the assumption of complete mixing of the products with the room air. While practical data on this subject are scanty, it is fairly certain that incomplete mixing under the conditions of natural convection can persist over distances of the order of normal room dimensions, and it is therefore to be expected that there will be regions of higher dew-point than the average.

In spite of the recommendations made in 1942 by the Committte of Enquiry on Sulphur Removal, the sulphur content remains (speaking generally) at such a high figure that it was considered worth while to explore the practicability of removing sulphur on a small scale *in situ* at the point of utilization of the gas, as is done, for example, in some glass furnaces. The alternative available methods for organic sulphur removal were compared in this connection and it was concluded that the use of a catalyst in conjunction with a suitable absorbent for hydrogen sulphide was likely to provide a satisfactory solution. By incorporating the catalytic unit at a suitable point in the heating appliance itself, the necessary temperature for efficient operation could easily be obtained, but it was found that the absorption of hydrogen sulphide by orthodox methods could not be satisfactorily maintained over a prolonged period owing to the low humidity and low oxygen content of the gases reaching the oxide purifier. It was therefore necessary to evolve an alternative approach to the oxide purifier, and the results of this work have not yet been put on a commercial basis. Sufficient, however, has been done to establish the feasibility of constructing a small sulphur-removal unit suitable for building into certain types of space heating appliances, the capacity being such that the renewal of the active agents need not be effected at less than yearly intervals.

One cannot leave the subject of flueless appliances without some reference to the cooker, on which nearly 75% of the domestic consumption of gas is burned fluelessly. The relatively short-term nature of most cooking operations normally limits the build up of products concentration. Because of this and the attendant evolution of steam and cooking odours, the criteria applied to domestic kitchens in respect of condensation and stuffiness are quite different from those applied elsewhere in the house, and it is evident that, irrespective of the fuel used for cooking, higher standards of kitchen ventilation would be advantageous generally. Where installation cost is a secondary consideration, fan-assisted ventilation from a hood over the cooker, as practised in most commercial kitchens, is the most satisfactory functional solution.

Inventive effort in connection with flues has been almost entirely devoted to the prevention of down-draught. That patents covering this type of device greatly outnumber any others relating to flue equipment will not surprise city dwellers whose rooftops are studded with innumerable strange embodiments of aerodynamic misconceptions. There are several types of flue terminal of proven value, but it is still not generally realized that, however well-designed a flue terminal may be, it can only eliminate or minimize the dynamic effects of wind. It cannot overcome effects due to unfavourable static conditions, although in some circumstances the likelihood of down-blow can be reduced by causing wind movement to produce a suction in the terminal throat. This result can, however, only be brought about by accentuating the variation in flow in the flue caused by varying wind conditions, and must be regarded as a functionally unsatisfactory subterfuge. It is only by bringing inlet and outlet pressures into a constant relationship that both appliance protection and ventilation control can be achieved with an orthodox flue.

A common method of protecting the combustion process in a gas appliance from the effects of unfavourable draught conditions is to install a draught diverter between appliance and flue. The early experiences with devices of this type designed on a trial-and-error basis led in due course to the formulation of certain *ad hoc* standards of performance which are set out in B.S.S. 766:1938 ('Bafflers or Draught Diverters on Gas Appliances, including Recommendations for Flue Terminals). In designing appliances to meet these requirements, it has often been difficult to interpret the effects of changes in construction, and progress on a trial-and-error basis has been slow.

Besides removing the products of combustion, the orthodox chimney or flue provides a means of ventilation. However efficiently draught diverters or breaks may protect the combustion process in a heating appliance from outside disturbances, the rate of air change in a room may nevertheless be considerably affected by internal or external conditions, with consequent changes in heating efficiency. The problem of separating heating and ventilation, particularly where hazards due to inflammable vapours in the atmosphere occur, as in garages, led to the idea of the balanced-flue appliance, in which the combustion air is taken directly from the outside adjacent to where the products are expelled.

The aeromotive force of such an appliance is very small and extremely sensitive to the smallest disturbance due to the fact that inlet and outlet are necessarily some practical distance apart, and so arranged that no feed-back of products into the inlet can occur. The accuracy of pressure balance necessary depends on the appliance design, and has hitherto been related only to flame stability under the most adverse wind conditions. It is almost equally important, however, that efficiency should not be impaired if adverse wind conditions persist, and to meet this requirement demands a much closer balancing of inlet and outlet pressures. An even more exacting requirement arises in balanced-flue water heaters, where the slightest degree of unbalance can cause freezing and bursting of the water system in frosty weather during periods when the main burner is not in operation. The proper and safe functioning of a balanced-flue appliance is therefore mainly dependent on the design of the terminal, which should ensure the greatest possible degree of balance under all conditions.

Conclusions

It was not to be expected that a brief review such as this would bring to light any sovereign remedy for the ills associated with combustion products. It is, however, clear that all sections of the industry can make substantial contributions, and, more specifically that some of the main obstacles could be overcome by means already to hand, given the will to overcome them.

If, as the authors believe, the industry intends to address itself more seriously than in the past to the space heating and water heating loads, the orthodox methods of products venting may well prove a serious handicap both functionally and as an important factor in installation cost. The lines of action briefly summarized below should go far to circumvent the principal current difficulties and hence to clear the way for substantial expansion of these loads.

The first, and, in the authors' estimation, the most important line of action, is a general and substantial reduction in the sulphur content of town gas, permitting *inter alia*, a wider use of flueless appliances giving 90% efficiency of utilization. It is realized that plant difficulties since the second world war have retarded developments in this connection, but one senses a lukewarmness on the manufacturing side of the industry when the subject is mentioned, and a tendency to treat sulphur reduction as a secondary problem that can be relegated indefinitely to the future. It does not seem to be sufficiently clearly recognized that the presence of sulphur in combustion products at the levels generally prevailing to-day is not only responsible for a substantial proportion of the cost of maintenance of appliances but also very appreciably limits the potential utilization efficiency. The cost of removing sulphur by established methods can be reliably estimater. Has any estimate been made of the cost to the industry and the nation of *not* removing sulphur? Such a calculation, the authors submit, deserves very high-level attention.

The second line of action, of immediate practicability, is the training of personnel to ensure that flued space heating appliances are installed to give rates of air change compatible with optimum comfort conditions in the rooms to be heated. Arising from this is the need to design simplified field test equipment to enable the relevant data to be quickly obtained on site.

The third line requires the more intensive study and development of balanced flues, common flues, and related devices leading to reduced installation costs, better control of ventilation, and higher overall efficiency of operation. Substantial progress should be possible on the basis of fundamental knowledge now available.

A fourth line of action, already initiated, includes the design of high-efficiency appliances operating on forced draught,

either fan-induced or generated, as in the pulsating combustion heater, by the operation of the appliance itself. A small fraction of the energy needed to operate an orthodox flue can, if correctly used, expel the products of combustion from an efficient appliance through a pipe not much larger than that needed to convey the fuel to the appliance.

DISCUSSION

Mr. L. W. Andrew, Manager, Watson House, opening the discussion, mentioned four items of the paper with which Watson House was in complete agreement: First, the immense value of flue restrictors and the necessity of making use of non-conventional flues and fireplaces; second, the importance of ensuring that convector fires are totally unaffected by flue pull; third, the vital importance of really adequate kitchen ventilation; finally, the importance of specialised training in the installation of space heaters and flue-less appliances generally.

On natural ventilation it was felt the authors might well look more closely at that. So many flues worked so well that they should explore for unconventional methods of using natural flues and natural means of ventilation. Watson House was now attempting to bring together all their knowledge of flues and ventilation in a form to ensure the most practical application of proper principles in practice on the district.

Turning to high efficiency appliances, Mr. Andrew said they supported the suggestion that they were needed, but also being considered was the possibility of fully-condensing appliances in which one might be able to get an efficiency approaching 100% and still extend the use of those appliances fluelessly.

Consideration had been given to the use of forced ventilation on individual flues and a common flue system. Two installations had been designed—one in a large block of flats with individual flues mechanically vented, and one with a common flue mechanically vented. On balanced flues, they felt the roof space was a neglected point at which to terminate the balanced flue.

The authors hardly gave full credit to natural ventilation. Surely there were many gas fires whose flues by their dimensions were themselves functioning as restrictors. If one fitted properly a gas fire to a flue, one was automatically restricting the flue to a reasonable and sensible extent.

Mr. Andrew was on the side of the authors as far as the general ill effects of sulphur were concerned; this problem, he agreed, should be left to the highest authorities with hope and trust.

Dr. W. A. Simmonds, Birmingham Research Station of the Gas Council, said many of the authors' points were equally valid in the industrial field where the problem was just as acute. The main characteristic of the industrial use of gas was always its wide diversity. However, there were many industrial appliances which were long-flued, whereas fires and water heaters had short primary flues. The flue pull became an even more important factor under natural draught conditions when the primary flue was long. The necessity for recuperators was probably greater in the industrial field and certainly it was in this quarter that they were mainly used. Condensation was not, in general, an important factor in industrial practice, but the sulphur content of the combustion products certainly was. Cases often occurred where the reduction of the sulphur content of town gas would enable loads to be gained for gas, often by the economy associated with direct firing, provided the sulphur contents were consistently low.

Dr. Simmonds therefore supported most strongly the authors' plea for the general and substantial reduction in sulphur content. This was especially urgent since in many areas the sulphur content of town gas showed a tendency to rise due to the increased sulphur content of the coals being carbonised.

Mr. J. B. Carne, South Eastern Gas Board, Old Kent Road, on the problem of flueless space-heating, supported the authors' observations on the restrictive effect which the sulphur content imposed, and would even go further in drawing attention to the difficulties created by its presence in flues which were likely to remain below the acid dew point. He felt that the magnitude of the deleterious effects of sulphur were not sufficiently appreciated probably because of the insidious nature of the acid dew. The effects of oxides of nitrogen must not be overlooked where flueless heating is concerned, and for this reason he did not share the authors' enthusiasm for this form of heating even if the gas were sulphur free. Their sights on the future rather visualised the efficient flueing of a far greater proportion of gas appliances, and to this end he considered that the industry's maximum effort should be towards the exploitation of the balanced flue in all its aspects and to the establishment of data for the design of conventional flues with optimum performance acceptable to architects for buildings of modern design.

On draught diverters the authors while successfully achieving this object, seemed to ignore the subsequent problem of products disposal, and thereby presented the installation designer with an initial handicap in that he must sacrifice energy in his secondary flue in order to reverse the downward flow which the authors' design has imparted to the products.

Mr. W. G. Phillips, Commercial Manager, Watford Division, Eastern Gas Board, stressed the fact that the existence of high concentrations of sulphur handicaps the sales of gas in many fields. The authors referred to the effect of sulphur compounds on limiting the use of gas for space heating and increasing the cost of maintaining water heating appliances. These two problems were of the utmost importance to the industry, and alone, he would suggest, warranted a drastic reduction of sulphur compounds. He felt that proposals for constructing sulphur removal units for building into certain types of space heating appliances was a policy of despair.

Dr. Hans A. Blum, Ewart & Son, Ltd., was glad that the importance of the appliance itself as a part of the down draught breaking device had been stressed, as this point was often insufficiently understood.

He gave special thanks to the authors for suggesting a high-level estimate of the cost of *not* removing the sulphur. From very tentative estimates made in the past it would appear that this figure might be most surprising, several times as high as any suggested for removing sulphur. This may be very much out either way, but it certainly supported the demand for an authoritative estimate of this kind.

Mr. A. A. Old, North Thames Gas Board, said the conclusions the authors had drawn from the result of testing gas fire flues should encourage those who did not favour a change from orthodox arrangements, but one wondered what effect other types of flue terminals would have had on the results. It may be that before mechanical removal of flue products could be extensively practised, appliances, specially designed with this end in view, might be required.

Mechanical extract should permit appliances to be designed for greater resistance to flue gas passage, thus smaller heat exchange units could result. It should eliminate the draught diverter, and reduce the diameter of the flue connection, all of which; though contributing to possible improvements in appearance, and removing restrictions in location, would entail duplication of appliances to suit either natural or mechanical removal of the flue products.

Mr. L. T. Minchin said the paper referred to a balanced flue section; if the authors were referring to the Dutch appliance, that was a specially shaped plate in which the holes taper inwards opposite the air entry and outwards opposite the flue exit, and its working entailed in each case the gases passing through a tapering passage. The intention of this was that it should make it easier for the air to go in, and easier for the flue gases to go out at the right place.

Mr. A. R. Bennett, Research Manager, Radiation, Ltd., replying, said he could not hope to do justice to the matter in a few minutes. He was interested in the general trend of discussion, in that there seemed to be a very strong desire to give a new lease of life to the orthodox flue. They did not say much about that in the paper, because they did not feel they were authorities on orthodox flues. They drew attention to a few of their characteristics.

Had the contributors who suggested the natural draught flue as a desirable device to have, really thought about it? It struck him as a sledge hammer to crack a walnut in the light of alternative possibilities available.

The only other comment he would make was on the monumental silence of the gas-making people on the question of sulphur removal. He did not know what significance they should attach to that, but felt it was a problem that had been rather pushed into the background, and was a matter for more attention than had been given to it up to the present.

The Selection of Driving Units for Gas Compressors*

By D. F. RUDGE, ASSOC.M.INST.GAS E., G.I.MECH.E. †

PRIME MOVERS in common usage fall within three main headings: steam, electric and diesel; and the choice between these lies largely in the size and location of the installation. Gasworks have their own individualities concerning efficient power usage, and the overall scheme of works power must be considered when installing prime movers. At some works steam may be produced economically from waste-heat; at others, particularly large works, waste-heat steam may be used for generating cheap electricity. In these cases the economics of a prime-mover scheme can be very involved, since so many factors, such as steam-raising costs, have to be taken into account.

In a number of cases, particularly on those works which are not used as manufacturing stations but are used for the re-distribution of gas, steam may not be available and the choice would lie between electric and diesel. This paper endeavours to throw some light on some of the factors influencing the choice of electric motors as against diesel engines, and to try to explain some of the complexities which may arise when installing electrical plant.

District Requirements of Gas Compressors

In the experience of the author, it would appear that requirements of gas compressors follow no fixed pattern,* and that each installation should receive individual study. Compressors and their driving units operate most efficiently when run at full load and full speed, but unfortunately these conditions are not often possible on account of district requirements.

For bulk supply schemes in which gas is to be pumped from gasholder to gasholder, compressors may be operated at full-load and full speed and hence at maximum efficiency; and variation in gas requirements may be obtained by shutting off the compressors. This system is occasionally possible but difficulties arise if a gas supply is required at any place en route in a district not served by a gasholder. Other systems of gas distribution produce numerous variations in gas volume and pressure requirements. These usually necessitate departure from the most simple system of compressing in favour of the installation of various sized constant-speed compressors or variable-speed compressors.

Characteristics of Gas Compressors

A compressor can be provided to meet almost any requirement, and an adequately powered machine can be provided to drive it. The installation may fufil its gas compressing requirement admirably, but the crux of good design of the installation of various-sized constant-speed compressors or of years, and its low running and maintenance costs. Providing therefore a suitable type of compressor to meet the gas duty is obtained, the most suitable type of prime mover must be selected, and there are various types from which to choose.

Gas compressors fall into two main classes: 'positive' and 'non-positive'. Positive types include such as reciprocating; Rootes; and rotary rolling-drum types. Non-positive include such as centrifugal and turbo-types.

From an operational point of view the difference between these classes is that with the former; if the operator inadvertently shuts the outlet valve and the relief valve does not function, serious damage may result; in the latter, no damage other than reduction in pressure on the district would occur. From the theoretical point of view there is considerable difference.

Positive compressors are characterised by the fact that volume, speed, pressure and horse-power are all more or less proportional. They would be proportional but slip of gas at certain conditions tends to confuse the exactitude of this relationship. Also the horse-power required to overcome the inertia of the moving parts is the same throughout the gas-output range, and the relatively useless effect of this horse-power makes its presence felt more at low outputs than high outputs. The horse-power required to drive a positive type compressor will therefore vary almost directly in accordance with the product of 'gas displaced' by 'pressure rise.'

Non-positive compressors are characterised by the following relationships:—

1. The volume passed is proportional to the speed;
2. Pressure is proportional to the square of the speed;
3. Power absorbed is proportional to the cube of the speed.

From an 'economics' point of view, the last of these is probably the most important relationship since by reducing the speed of a machine to one half of its full value, the horse-power required to drive it would be reduced to one-eighth of its full value. Consequently, by employing only a small amount of speed control of the machine a large amount of power may be saved.

It can be shown that depending on district requirements it would be possible, even with a constant-speed machine, to effect a saving in horse-power by reducing the outlet pressure on the compressor. It is quite possible to obtain this condition in practice by by-passing the gas from outlet to inlet compressor, or preferably to inlet gasholder main.

This is the normal method used for relieving excess pressure on 'positive' machines, and for this purpose it is very suitable. But for outlet pressure control the method is bad since it is impracticable to operate a variably weighted relief valve and overheating of the compressor may occur at low loads when large volumes are by-passed to inlet compressor.

Another method of obtaining power saving by throttling the gas to inlet compressor is bad in the case of the 'positive' machine since excessive vacuum may be caused in the system. With the 'non-positive' machine the method is quite acceptable, and indeed often practised, but the power saving is approximately one-half only of that which could be saved with speed control.

Therefore it is apparent that speed control of the compressor is desirable in all cases except those fortunate instances occasioned by constant-load bulk supply schemes. Consequently when choosing the driving unit, particular regard should be given to the suitability of the unit for speed-control.

Diesel Engines as Compressor Driving Units

The diesel engine is inherently 'noisy and smelly,' but has the redeeming feature that it is not susceptible to extraneous interruptions of power supply—provided that its fuel-oil storage capacity is large enough. As such it is ideally suitable for a stand-by machine and has for many years been treated as such, being used only in emergency.

With the present-day high cost of electricity it is now apparent that in certain instances an economic case can be presented for running a diesel engine in preference to an electric motor.

It is appreciated that maintenance required by a diesel engine is high compared with an electric motor, but it may not always be appreciated that skilled men may not be available to maintain the diesel engine. A contract can be made for periodic maintenance, but for continuous running the periods of maintenance become very frequent. An idea

* Abstracted from a paper presented to the Eastern Junior Gas Association on November 11, 1954.

In this paper the terminology given in B.S.1179 : 1944 'Glossary of Terms used in the Gas Industry' has been used, namely that a compressor is 'a machine which draws in air or gas and delivers it at a higher pressure.' Consequently the words 'booster' and 'fan' have been avoided wherever possible.

† Assistant to the Divisional Engineer, Lincolnshire Division, East Midlands Gas Board.

of some of the maintenance required (as recommended by most reputable manufacturers) is as follows:—

Every 1,000 hours (or 42 days continuous running)	Clean and grind-in exhaust and air inlet valves. Clean injectors.
Every 3,000 hours (or 126 days continuous running)	Clean and grind-in starting air valves. Clean and inspect pistons.
As required (approximately every 600 hours)	Check and inspect crankshaft bearings. Change lubricating oil.

It is difficult to generalise on installation costs since so much depends upon local factors, but for comparatively straightforward installations a diesel engine with a large foundation, oil storage facilities, and water-cooling system, is bound to be much more costly than an electric motor. A feature of the diesel engine is that speed-control is easy and that the governor controlling the speed can be automatically actuated by gas pressure, operating through a Hopkinson or similar type of regulator.

Electric Motors as Compressor Driving Units

There is little that requires saying to the effect that an electric motor provides a clean, silent and reliable method of driving compressors; it is well known already.

The diesel engine converts fuel-oil into mechanical energy by combustion of the oil in the cylinders. There is little variation to this theme. Cylinders can be enlarged, valve sizes altered and sundry modifications made, but, fundamentally, the principle of the engine remains the same.

On the other hand, there is no fixed pattern whereby electrical energy may be converted into mechanical energy. The types of electric motor are many, and this complicates the selection of the correct type of motor for the job. And in this respect the correct type of motor is that which not only fulfils its mechanical function, but uses the smallest amount of electricity.

The good installation is not necessarily the one which meets the requirement of the gas distribution system down to the last letter in speed variation and automatic control, but rather the one which meets the requirement sufficiently well for ease of operation, and at the same time is not extortionately expensive in the initial costs. An economic balance has, therefore, to be struck between the running and annual costs.

Electricity Tariffs

These tariffs appear to be designed:

(*a*) to entice consumers to use more electricity by making the scale of charge progressively less as the 'units consumed' increase;

(*b*) to induce consumers to improve the load factor on large installations by charging separately for each kVA of maximum demand.

Normally, electricity supplies to compressor installations are charged as part of the main electricity supply to a gasworks. As such, and as a maximum-demand tariff is usually used and also since efficiencies of different types of motors vary, it is impossible to state a standard cost of running an electric motor per b.h.p. hour; the cost of running the motor has to be worked out according to the power costs on that works.

For a large compressor installation it is a fact that by using a suitable electric motor as the driving unit, the overall load-factor on the works would improve with consequent reduction in power costs for the rest of the gasworks.

There is the danger, however, when this practice is employed that if a 'stand-by' diesel engine is used preferentially because of lower fuel costs—one will be faced with a bill for the fuel-oil plus an electricity bill for 'standing charges.' Therefore, once having decided that an electric motor installation is justifiable, it pays to stand fast to that decision and run the motor as continuously as possible.

On a gasworks the electricity load-factor is impaired by using a large number of items of equipment during certain periods of the day, and when a maximum-demand tariff is used, the power usage during these periods would increase the cost of electricity over the whole period on which the tariff is based. It may be unnecessary to run all these items together and maximum-demand alarms are devised to warn the consumer so that he may stop the unimportant items during these periods. This can apply particularly to electrically-driven compressors operating on bulk supply schemes since it is often quite possible to avoid the peak power usage periods.

Types of Drives

For driving compressors perhaps the most popular electric motor is the induction-regulator controlled variable-speed A.C. motor, the feature of which is that smooth speed variation may be obtained without converting A.C. to D.C. But as with all types of electric motor systems which provide smoothly controlled speed, the cost of the equipment, particularly when large ranges of speed variation are required, may be prohibitive.

The use of the hydraulic-coupling is interesting. It is useful for installing between a driving and driven unit to reduce the starting current required by, for instance, a squirrel-cage motor. More particularly useful for compressor drives is a development of the above—the scoop-controlled fluid coupling, which provides easily operated infinite speed variation. The economics of such an installation are similar to those described for the slip-ring induction motor; there would be no power saving when driving 'positive' compressors, but the saving with 'non-positive' compressors would be considerable.

DISCUSSION

Mr. Forbes (Scunthorpe) wished to compliment the author on a succinct presentation of the factors necessary in deciding between electric motors and diesel engines as compressor-driving units. He asked whether:

(1) Silencing of diesel engines where required constituted much financial outlay,

(2) 30 years depreciation was an actual or an amortization figure,

(3) extra labour required on diesel maintenance showed a bias in favour of electric motors,

(4) local general labour was normally sufficiently qualified to deal with diesel maintenance.

Mr. Rudge said costs of silencing were not considered when compiling the appendices to the paper. Silencers were of course unremunerative. It may be that the baffling effect of an exhaust gas waste-heat recovery system may constitute a silencing effect, and in this case, the use of such a silencer could be economically justified; this would certainly apply to diesel engine installations in other industries, but on the gasworks where steam is produced from other sources, the use of a diesel waste-heat system may not be required.

Where noise was considered to be a nuisance, the building housing diesel engines should be sound-proofed, which would result in high costs owing to the size of the diesel unit. It was added that no noise problem existed with electric motors. Thirty years depreciation was the figure given in the Evetts Report for gas compressors (including driving units). It was thought, however, that the life of the diesel engine would be shorter than that of most electric motors.

Owing to the frequency of maintenance and in view of the lack of maintenance personnel at certain gasworks, it was thought advisable to carry a stock of spare parts, for instance a complete cylinder-head assembly for re-fitting when the exhaust and air inlet valves required attention. A manufacturers' servicing scheme could then be used for carrying out maintenance on the parts removed from the engine.

Mr. Spiller (Cambridge): Is the question of flame-proof electrical gear a factor taken into consideration—with high initial costs, high maintenance costs and a high standard of servicing knowledge required?

Mr. Rudge: In the Lincolnshire Division the practice was to provide flame-proof electric motors for sizes up to approximately 25 h.p. and above this to build separating walls between the motor and the compressor with an extension shaft and wall-gland.

Where flame-proof motors were provided the switchgear would be installed outside the flameproof zone so obviating the necessity of providing flame-proof switchgear.

It was felt that the maintenance of flame-proof motors was not necessarily higher than with other types, but it was agreed

that the servicing of diesel engines by general gas works staff was easier than the servicing of electrical installations.

Mr. Hull (Norwich): (1) Are maintenance costs of diesels related to b.h.p. as is done with electric motors (2% b.h.p.)?

(2) Should the air for combustion on a diesel be taken from the outside atmosphere or from within the engine room?

(3) Is flame-proofing necessary with diesel engines?

Mr. Rudge: (1) No standard basis for maintenance costs on diesels has been considered; the costs given in the appendices to the paper being based on anticipated circumstances at the gasworks in question.

(2) This was a debatable point but it was thought that for diesel engines up to say 300 h.p. there were certain advantages in providing the air intake within the engine room. This would allow good ventilation of air within the engine room, but steps should be taken to ensure that air entering the room was adequate. Very cold air entering the engine from outside the building might be detrimental to its performance.

(3) Diesel engines were considered to be probably more dangerous from the flame-proofing aspect than electric motors. Proof there was danger was given by the fact that explosion doors were frequently fitted to diesel engine crank cases. Additionally, inspection cocks were provided on cylinder exhaust outlets which were often used for checking the colour of the products of combustion, which would, of course, allow these products to enter the flame-proof zone.

Mr. Bland (Peterborough): In the event of a complete failure of driving unit (such as a sieze-up) is it any easier to rectify the position with a diesel engine than with an electrical installation owing to the more complicated set up in the latter case?

Attention was drawn to the fact that recently a case had occurred where an elecric motor completely burned out.

Mr. Rudge: It was thought that generally it was easier to maintain the diesel engine, but much depended upon the type of electric motor used.

Mr. Bernard Clarke (General Manager, Lincolnshire Division, congratulated Mr. Rudge on an excellent paper. Outlining the background to this paper he referred to the distribution integration schemes planned in the Lincolnshire Division of the East Midlands Gas Board. He felt that the author has been sound in his reasoning and approach to the problem of deciding upon the type of power unit required in the instances referred to—with the aspects of costs, reliability and maintenance well-balanced.

In closing, he added that the success of any such scheme also depended upon either the efficiency of the electrical equipment on the one hand and the standard of service provided by the diesel unit manufacturers on the other.

C.U.C. EASY PAYMENT SCHEME

Householders and tenants will be able to obtain the latest fires, stoves, cookers, and other improved domestic solid fuel appliances on easy payment terms under a scheme announced by the Coal Utilisation Council at a Press conference on December 13.

A list of these appliances, which are recommended by the Council as attaining a high standard of efficiency, is published by the Council every six months, in consultation with the Ministry of Fuel and Power. All the appliances listed will burn smokeless fuels as well as household coal.

The Coal Utilisation Council has made arrangements with the Mercantile Credit Co., Ltd., a London finance house, for credit facilities to be available to members of the Council's Panel of authorised distributors. There are about 750 of them throughout Britain.

The staffs of those builders' merchants and ironmongers who display the C.U.C. yellow sign have been trained by the Council to advise the public on the selection, installation and maintenance of the new appliances and on the fuels they use.

Under the C.U.C. scheme the public can pay for a new appliance over a period of two years or less. They can also have a fireplace surround installed, and the cost of this and the installation of both the appliance and surround may be included in the credit sale agreement in certain circumstances.

The scheme will operate independently of any Government subsidy for modern appliances which might be sanctioned following a recommendation of the Beaver Committee.

The Coal Utilisation Council, conscious of the fact that the gas and electricity industries have for many years operated easy payment schemes for their appliances, first started pressing for an extension of credit sale facilities for modern fuel appliances four years ago. The Ministry of Fuel and Power supported the Council on this, and Treasury approval has now been granted.

The C.U.C. foresees a considerable increase in the demand for the new fires, stoves, cookers, combination grates and boilers if its scheme is widely taken up by the appliance distributors. It has been assured by the manufacturers that there is sufficient productive and labour capacity available to meet a sudden jump in demand.

SWISS ASSOCIATION OF GAS AND WATER ENGINEERS

The 81st annual general meeting of the Swiss Association of Gas and Water Engineers was held in St. Gall, under the Presidency of Colonel A. Teutsch (Berne). There was an attendance of about 400, including ladies and a strong representation from kindred associations in other countries. Among the latter were Mr. L. Stoll (President, Austrian Association of Gas and Water Engineers), Mr. A. de Brouwer (President Belgian Gas Association, accompanied by the Secretary, Mr. R. H. Touwaide), Mr. M. Ferlet (President, French Gas Association), Mr. W. K. Tate (President, Institution of Gas Engineers, accompanied by the Secretary, Dr. W. T. K. Braunholtz), Mr. P. Hijdelaar (Secretary, Netherlands Gas Association), together with representatives of the German Gas Associations.

The meeting was held, as usual, over a week-end and the programme followed the customary plan. On the Saturday afternoon members visited the local gasworks and water works, situated side by side some miles from St. Gall on the shore of Lake Constance. That evening was occupied by an informal social occasion.

The official business of the annual general meeting took place on the Sunday morning and included the formal agenda items, an address by the President and two technical papers, one on a gas subject and one on water. The gas paper was by Mr. M. Bernard, Chief Engineer of the Paris division of Gaz de France, and dealt with the use of coke in modern automatic central heating boilers, a subject of great current interest to the Swiss who are faced, in this field, by keen and growing competition from oil.

After the official business, the foreign delegates and their ladies were entertained by their Swiss hosts to luncheon, at which the President of the Institution of Gas Engineers conveyed the cordial greetings of the members of the Institution and the appreciation of all the visitors for the warm hospitality of the Swiss Association. The official dinner of the Association, followed by dancing, was held on the Sunday evening.

Visits for the ladies were arranged on the Saturday afternoon and Sunday morning. Unfortunately, Sunday was thoroughly wet and the projected afternoon ascent, by suspended cable car, of the Saentis, the principal mountain (about 8,500 ft.) of the canton, had to be abandoned. On the Monday, the members and visitors, with ladies, enjoyed an all-day cruise on Lake Constance.

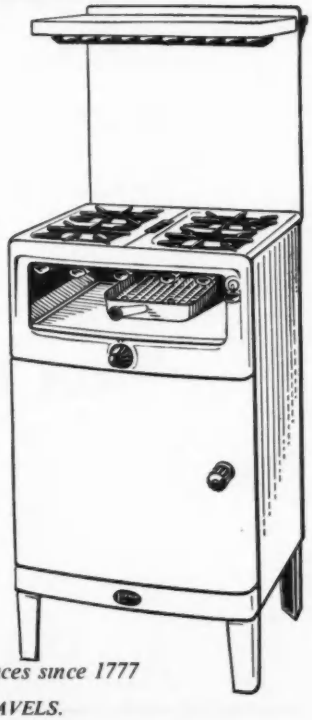
The gasworks of St. Gall, originally founded in 1857, now carbonizes some 22,000 tons of coal per annum in an installation of intermittent vertical chambers, with a make of about 460 mill. cu.ft. of gas. It serves more than 28,000 consumers. The housing of every item of this plant was noteworthy and the spotless cleanliness throughout was striking.

The foreign visitors were most grateful to their Swiss colleagues for their characteristic kindness and hospitality.

Putting gas to good use...

In 1784 (seven years after Flavels commenced business) Vincent Leonardi used a gas to make the first balloon ascent in Britain.

Today the best and most economical domestic use of gas is made by the Flavel '68'—the medium priced bow-fronted cooker, that sells as fast as the hot cakes it bakes.



The FLAVEL '68'

FLAVELS *of* **LEAMINGTON**

Makers of fine cooking and heating appliances since 1777

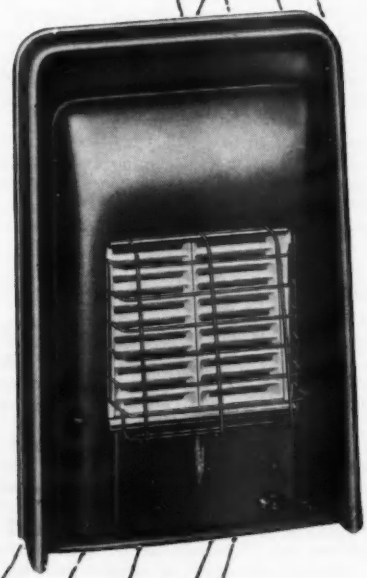
Telephones : Leamington 100 (Head Office) 3091/2 (Sales). Telegrams : FLAVELS.

More warmth for his

The consumer these days is inclined to look upon space heating by Gas Fire, though eminently desirable, as rather a luxury.
The NEW WORLD 877 Vecta Beam which provides both radiant and convected heat will, however, give him a good deal more warmth for his money than he thinks.

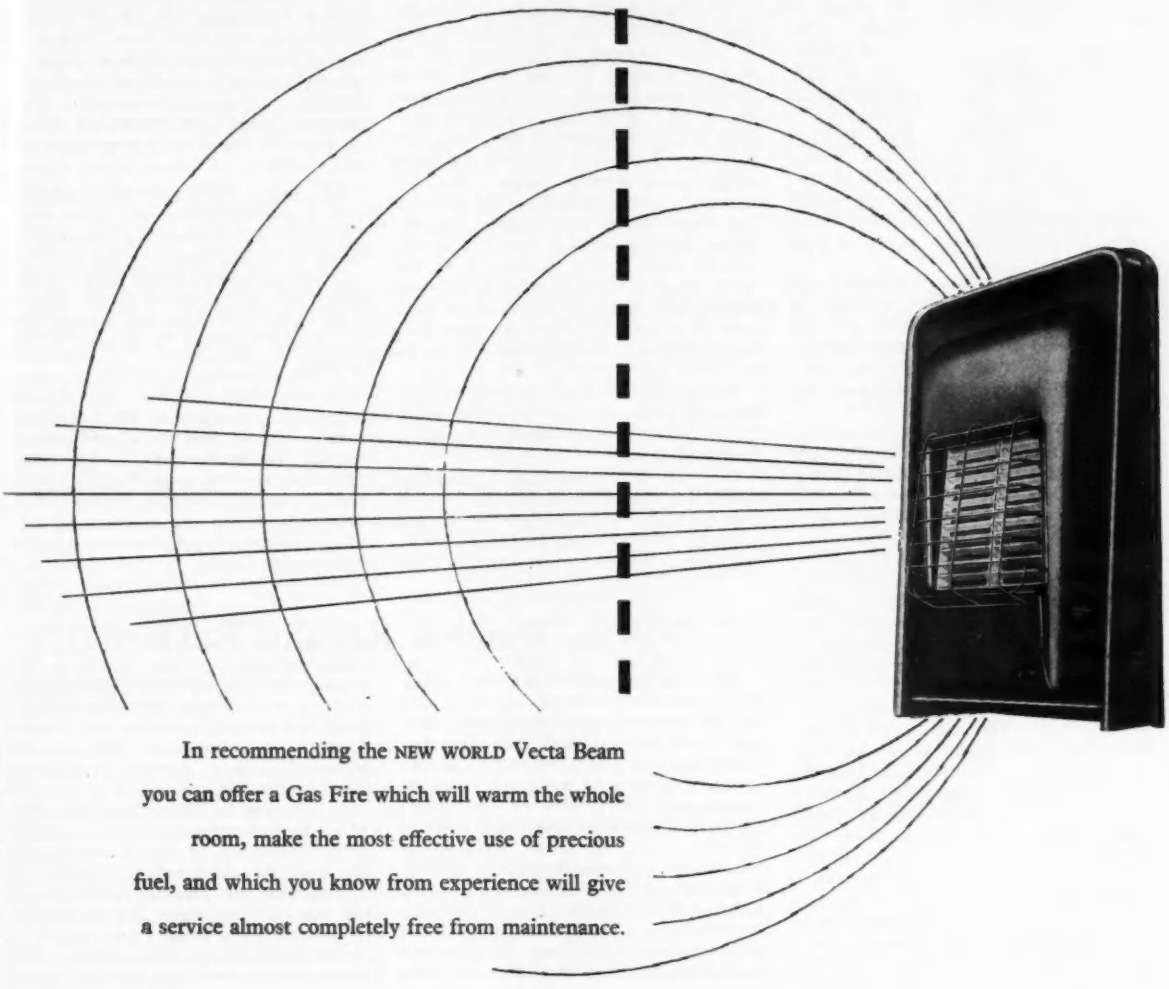
THE NEW WORLD VECTA BEAM

A soft radiant heat is provided by the well-known Silent Beam unit, but in addition, air drawn in at the base is heated at the back of the Fire and is guided out through the top outlet into the room. Fuel isn't wasted sending a lot of warm air up the chimney.



Recommend

money ! . . . . .



In recommending the NEW WORLD Vecta Beam you can offer a Gas Fire which will warm the whole room, make the most effective use of precious fuel, and which you know from experience will give a service almost completely free from maintenance.

gives both RADIANT and CONVECTED heat

NEW WORLD
PRODUCT OF Radiation Ltd

gas fires

RADIATION GROUP SALES LIMITED, 7 STRATFORD PLACE, LONDON, W.1. MAYfair 6462

GAS CONSULTATIVE COUNCILS

Cooker Cleaning Problems in Somerset

The South Western Gas Consultative Council agreed at Taunton on December 2 not to pursue its request for a cooker cleaning service to be started by the South Western Gas Board. After hearing the results of a survey of a cross-section of consumers in the Glastonbury and Wells area, where the request for a cleaning service originated, the majority of members felt that the demand would be too small to enable an economic charge to be made. It was stated that the Board's existing cooker maintenance service (which does not include cleaning) is free to consumers, on request.

Mr. W. J. Baker (Board Member) said it was explained to 93 consumers at Glastonbury and 87 at Wells that the Board would recondition their cookers approximately twice a year at a cost of 20s. to 25s., but the response was absolutely negative.

Mr. T. H. Martin (Bristol) said his idea was that the Board did not want to do anything about the matter at all. There might be an overwhelming demand for a small pilot scheme in another part of the region.

Mrs. B. J. Shell (Melksham), speaking as a housewife, said a cooker should be cleaned frequently; if 'let go a whole year' it would have to be reconditioned. In 99 cases out of 100 the housewife was best able to keep her cooker in reasonably good condition.

Mr. J. D. Duncan (Wells) said the reconditioning service mentioned by Mr. Baker was not what had been suggested; and Mr. H. Morland (Glastonbury) said Mr. Baker had given a 'stone-walling innings' which would have been more appropriate in Australia.

The Deputy Chairman, Miss J. Stephen (Bristol), said there was no connection between reconditioning and an ordinary cooker cleaning service. 'It is no good Mr. Baker trying to put that one over on me,' she declared. 'We are a bit sick and tired of being treated in this fashion by the Board when we ask for certain things to be done or certain investigations to be made. As Mr. Morland has truthfully said, we are stone-walled every time, and I hope we shall not have any more of it.'

Mr. Baker said when he referred to reconditioning he really meant they did not want to advertise the fact that they cleaned cookers. In the survey at Wells and Glastonbury consumers were taken at random and asked if they were interested in the cleaning and reconditioning of their cookers once every six months at a charge of between 20s. and 25s. About 13% were interested if there was no charge. That Council would like a group of men going over the area to clean cookers every month or two at a very small cost. His opinion and that of his colleagues on the Board was that they could not do it. It was simple to clean a cooker once a week, but if left for two months it would be nearly a two hours' job.

Mr. Duncan said when the subject was first discussed by the Council there was a certain amount of publicity and he was approached by perhaps a dozen people who thought a cleaning service would be a good idea. 'I would have been far more convinced that there was no demand for it if a letter had been sent to consumers, rather than an approach being made by employees of the Board, when it is obvious that the Board does not want to institute the service or feels that it cannot. I do not think we should try to make housewives virtuous—if it is a virtue to clean your own stove—if the Board can provide a service at a price they are willing to pay.'

Mrs. Shell said such a service might become a burden on gas consumers generally, if it were used by only a certain section.

Mr. M. C. Meredith (Ilfracombe) asked why the Board should have to do this cleaning. It was not a skilled job to clean a cooker once or twice a week. Anybody could do it if they did not mind getting down on their hands and knees. Somebody like the window cleaner might do it, if one paid him properly.

The Chairman, Mr. A. W. Lovey (Taunton), said they were told when stoves were cleaned in some places by private enterprise small jets had been broken off. Board employees would be experienced men, but would enough of them be available, if required, to do the work?

Mr. Baker, replying to the discussion, said it was stressed at an earlier meeting that the service was required at Wells and Glastonbury, and that was why the survey took place there. It was undertaken by members of the Board's sales staff, who were not advised that the Board was not in favour of the scheme.

By 10 votes to five, the Council approved a resolution by Mr. F. D. Newcombe (Exeter) that the Council should not take any further action. An amendment by Mr. Morland that a postal census should be taken in the Wells-Glastonbury area as to the demand for a cooker cleaning service was defeated by 12 votes to seven.

North Thames Results Reviewed

Mr. Michael Milne-Watson, C.B.E., Chairman of the North Thames Gas Board, attended the November meeting of the North Thames Gas Consultative Council to give a review of the fifth annual report and accounts. He was accompanied by Mr. F. M. Birks (Deputy Chairman), Mr. Brian Wood (Secretary), and Mr. O. W. Wells (Chief Accountant). Councillor Edwin Bayliss, Chairman of the Consultative Council, referred to the harmonious relationship between the Council and the Board which had developed over the years and expressed the hope that it would long continue.

Mr. Milne-Watson first reviewed the salient features of the Board's problems and achievements during the first five years of its existence and mentioned that of the £5 mill. allocated for expenditure on improvement and extension of the by-products plant, £3¼ mill. had already been spent. The number of gas consumers had increased by 3% during the five years and the gas demand from 367 mill. therms in 1950-51 to 378 mill. therms in 1953-54.

In reviewing the accounts of the last year's working (1953-54), Mr. Milne-Watson pointed out that there had been a small decrease in revenue from gas sold. This was attributed mainly to weather conditions, but increased competition from other forms of fuel could not be ignored. Coal cost £1 mill. more, but oil cost the Board less, a factor which the Board was taking into account when planning new plant. It was also pointed out that while administration charges were lower, payment of local rates had increased. In the net revenue account, attention was called to the increased interest received from hire-purchase transactions.

In referring to the balance sheet, Mr. Milne-Watson referred to the increased capital liabilities of the Board due to the issue of additional gas stock. He also pointed out that the revenue from the sale of by-products was nearly half of that from the sales of gas.

Commenting on the report, Mr. Milne-Watson said that the year under review was the end of the first stage of development planned by the Board. It was pleasing to record that there was a slight improvement in the quality of coal received and in answer to a question raised at the previous meeting of the Council, the following figures were given of the average prices paid for coal by the gas and electricity industries before the last war and at the present time:—Gas industry: 1938, 23s. 10d. per ton; 1954, 85s. 6d. per ton; difference, 61s. 8d. Electricity industry: 1938, 21s. 9d. per ton; 1954, 67s. 7d. per ton; difference, 45s. 10d.

Mr. Milne-Watson said he wished to make it clear that the qualities of the coal supplied were not the same for both industries. In spite of increased costs, the Board had held the price of gas to consumers longer than any other Board. Although the sales of gas were 1% down on the year, the appliance sales campaigns were meeting with con-

derable success, especially those for gas-ignited solid fuel grates and gas water heaters. The first-mentioned campaign was likely to be greatly assisted by the issue of the Beaver Report. In dealing with staff relations, attention was called to the reduction in the number of employees by 150 as compared with the previous year.

Questions having been invited, Alderman H. D. Cowan referred to the size of the financial reserves held by the Board and expressed the view that these were now more than adequate to meet any unforeseen contingency. He suggested that no further additions should be made to reserve funds, but that any future profits should be utilised for the benefit of existing consumers. Reference was made particularly to the Board's insurance and tax equalisation reserves and to the superannuation deposits in the hands of the Board.

Mr. Wells, after dealing with other points raised by Alderman Cowan on the Board's liabilities and assets, pointed out that the superannuation deposits were not the Board's property and could not be regarded as liquid assets. Mr. Milne-Watson said that the insurance reserve was a cheaper method of meeting claims than insurance through Lloyd's or other insurance organisations.

Alderman D. Wray supported Alderman Cowan in his general contention that reserves should be no higher than necessary to cover foreseeable liabilities. Any surplus should be applied for the benefit of consumers.

Mr. Milne-Watson, after informing Alderman G. H. Baker that there was no statutory limit to reserves, assured the Council that the Board had no intention of building up reserves more than were necessary for the conduct of the Board's business.

Alderman Wray, congratulating the Board on its report, questioned the numbers of employees shown under 'Production and Distribution' and 'Commercial.'

Mr. Milne-Watson explained that under 'Commercial' were included gas fitters as well as other gas sales staff. 'Production' related solely to staff employed in gasworks and on gas mains. With increasing mechanisation there would be a tendency in future for an increase in supervisory staff and a reduction in manual workers.

Mr. Howard Wells added his congratulations on the Board's report and commented on the good spirit which existed among the employees. He also enquired whether the Board had acted on any of the recommendations and suggestions mentioned in the Anglo-American Productivity Report on the Gas Industry which had been issued last year.

Mr. Milne-Watson explained that because of long-standing contacts with American colleagues and visits to the United States by the Board's staff, many of the suggestions made in the report had been adopted by the Board prior to the issue of the Report.

Mr. H. J. Scott congratulated the Board on a fine achievement in its five-year plan and enquired whether any large saving was to be expected from the change-over from light to heavy oil in gas production plants.

Mr. F. M. Birks explained that the change-over was experimental at present and would depend on whether the price of heavy oil remained attractive enough to warrant a permanent change.

Councillor J. W. Perotti enquired whether an extended use of oil for gas production would seriously affect the revenue from coal by-products.

Mr. Birks said that no serious effect was anticipated at present.

A letter had been received from the Ministry of Fuel and Power asking for the Council's observations on a draft Order which the Minister had been requested to make to amend the boundaries of supply of the North Thames Gas Board and South Eastern Gas Board at Barn Elms Park and Putney Park Lane in the Borough of Wandsworth. The two areas were being developed as housing estates by the L.C.C. and both Gas Boards were desirous of amending the existing gas supply boundaries to facilitate supplies of gas to the new estates in the most economical manner. No existing consumers would be adversely affected by the alterations in the boundary.

It was agreed that the Council had no observations to make on the draft Order.

The annual report of the Consultative Council, which formed an appendix to the report of the Board, has been published as a separate document, and we have been asked to mention that copies are available to any consumer in the area who cares to apply to the Secretary, Mr. W. Elliott, at the offices at Palace Chambers, Bridge Street, S.W.1.

Lord Mayor's Hospitality

The Chairman and members of the Southern Gas Consultative Council, together with Mr. W. K. Tate, President of the Institution of Gas Engineers and General Manager of the Eastern Division of the Southern Gas Board, Mr. R. W. Hewitt, Divisional Accountant, and Mrs. A. E. M. Oliver, who recently retired from the post of Deputy Chairman of the Consultative Council, were the guests of Councillor G. A. Day, Lord Mayor of Portsmouth, at a luncheon at the Portsmouth City Council Chambers on December 1 before proceeding with the business of their quarterly meeting. In a short speech of welcome the Lord Mayor referred to the public services of Mr. F. C. Rea, Chairman of the Consultative Council, and urged that the existence and functions of the Council should be more widely known. He regarded the Council as an 'economic stabiliser' working in the interests both of the Southern Gas Board and the gas consumers.

The subsequent meeting was held in the Council Chamber where, in addition to Mr. Tate, the Chairman welcomed an audience of local schoolboys and girls who had attended because the Chief Education Officer thought they would be interested.

Mr. Tate gave a brief informal talk in which he made it clear that he was speaking not as President of the Institution nor as Divisional General Manager but as an individual keenly interested in the gas industry. He spoke of dwindling coal supplies and of the industry's quest for other sources of gas supply. In 1949, he said, the carbonizing industries received about 50 mill. of the 76 mill. tons of what was considered good gas making coal produced; in other words they used about 65%, and the other 35% went into industry, commerce, for export, and for other purposes. It was estimated that by 1960 the coal industry would be raising 87 mill. tons of coal suitable for carbonizing, an increase of 11 mill. tons over 1949. The gas and coking industries expected to need 58 mill. tons by that time, or 78% of the total against the 65% which the industry received in 1949.

Before the war the gas industry was paying not much more than a quarter of the price it was paying for coal today, and for better quality. In the last four years there had been a tremendous upsurge in development and investigation into fuels, notably in the development of the 'Rochdale' process, heavy oil gasification, butane and propane/air mixtures, coal blending, and the search for natural gas. The recently published report of the Beaver Committee on Air Pollution had confirmed all that the gas industry had been saying for a long time about the advantages of smokeless fuels. The industry had a very fine research team and he had no doubt they were making progress in these times of tremendous change.

Replying to an expression of thanks from the Chairman, Mr. Tate said four years had elapsed since they turned the first sod for the foundation of the new East Cowes gasworks, and he hoped the works would be completed in a year or two from now.

It was reported that letters had been received from the Banbury Chamber of Commerce and the Wantage and District Chamber of Trade urging a greater measure of uniformity in gas charges and meter rents. The matter was referred to the divisional committee under Mr. N. Gardner, and it was suggested that a representative of the Board should be invited to attend so that the matter could be fully discussed. The Chairman reminded the Council that one of the basic points of the Ridley Committee report was that the price of gas should reflect the cost of manufacture and distribution in each locality, and that principle had been accepted as one which must dominate any price structure.

A member of the Council suggested that uniformity should be a national issue, and that there should be uniform tariffs for the whole country.

A letter was received from a Sherborne consumer complaining that tenants of council houses were not given freedom of choice in regard to gas and electricity. This, the correspondent understood, was

due to the policy of the local authority not to grant proper facilities to the Gas Board to install gas in new houses. One point that had been raised was that of a tenant who was at present living in a house without a supply of gas. Having purchased a gas cooker from the Board on deferred terms he was suddenly faced with the fact that his application for a council house had succeeded, and he was in possession of a cooker that was useless without a gas supply.

The Chairman said he had learnt from the Clerk of the Council that the houses were serviced for electricity at no charge to the council, whereas the Gas Board would have made a charge for installing a service. He had been assured that the sole reason for the exclusion of gas was that the council would have had to pay for it. All he could say at this stage was that the heads of the Gas Council and the British Electricity Authority were getting together with a view to setting up a code of conduct. It was obvious that whatever services were installed had to be paid for by somebody—probably by the general body of consumers.

Spares Service for Consumers

The Chairman said there had been a trickle of letters complaining about the spares service at various showrooms, and Mr. J. S. Woodrow (Reading) referred to irritation caused by delays in getting such minor matters as defective gas cooker lighters attended to. In one instance there was a story of two men calling to see a lighter and telling the consumer it would have to go away for repairs. A promised 'few days' lengthened into a month, the consumer was told certain spare parts were in short supply, and finally an appeal to a divisional general manager elicited that by a coincidence one of the very things needed had come in that day and would be fixed next day.

In another case a consumer had complained that he had not received the courtesy and attention which he felt he had a right to expect at a showroom in one part of a division and had met with satisfaction at a showroom in another part of the same division.

Lady Nunburnholme told the Council of her experiences in connection with the repair of her own gas cooker which, after some delay, had been sent back to Radiation in Birmingham. There had been no lack of courtesy; in fact she praised everyone concerned, and particularly Radiation, for the attention she had received. What she felt was that the Southern Gas Board should itself have some small repair plant at which repairs could be done more expeditiously.

It was agreed that all the spares service complaints should be referred to the standing committee for investigation and report to the next meeting of the Council, which is to be held at Reading on March 2.

Ham and Eggs

GAS EXHIBITS AT THE SMITHFIELD AND POULTRY SHOWS

At the Smithfield Show, which opened at Earls Court on December 6, the main attraction was beef—tons of it, breathing heavily and rolling its great eyes at the unfamiliar surroundings and the prodding, expert, fingers. But for many of the farmers and agricultural workers who thronged the show for its five-day run the lure was not so much Britain's finest bullocks but Britain's finest pigs. For Smithfield is a pork as well as a beef show, and consequently the Gas Council's excellent stand had exhibits certain to interest the pig breeder.

It is an interesting, although perhaps a little known, fact that from birth to bacon, gas plays its part in nearly every phase of a pig's life—and after-life. First, the gas-fired piglet warmer provides gentle warmth to tempt farrowed piglets into a nest or 'creep' where the sow cannot lie on them. After the pig is killed, gas-fired equipment is used first for scalding and singeing, and then for ham cooking, or bacon smoking and curing. Finally, gas makes the best use of what remains of the pig, by bone digesting and rendering of the fat. A gas-heated ham cooker, a smoke house, and a fat clarifier shown on the stand represented the equipment available for these processes. These were manufactured by W. J. Hubbard & Sons, Ltd., in the case of the ham cooker and fat clarifier, while Dowson and Mason Gas Plants, Ltd., were responsible for the smoke house. The exhibit included a list of the many other processes and tasks for which gas and coke are used in food production, poultry breeding and piggeries, on the farm and in the farmhouse. Equipment displayed included overhead gas-fired panel heaters, coke and gas boilers for hot water and steam raising, as well as a wide range of water heaters. A further point of interest were the three models of coke equipment, for grass drying and steam raising.

Visitors were reminded that the gas industry helps to produce food for the growing pig by providing, as a refined by-product from the gasworks, sulphate of ammonia, a valuable fertiliser. An increasing quantity of ammoniacal liquor is also being sold for direct application to the land, and a map on the stand showed the centres where advice could be obtained.

Over at Olympia the National Poultry Show and Convention, held December 9-10, overlapped the Smithfield Show, thus enabling visitors from out of town to—if we may so phrase it—kill two birds with one stone.

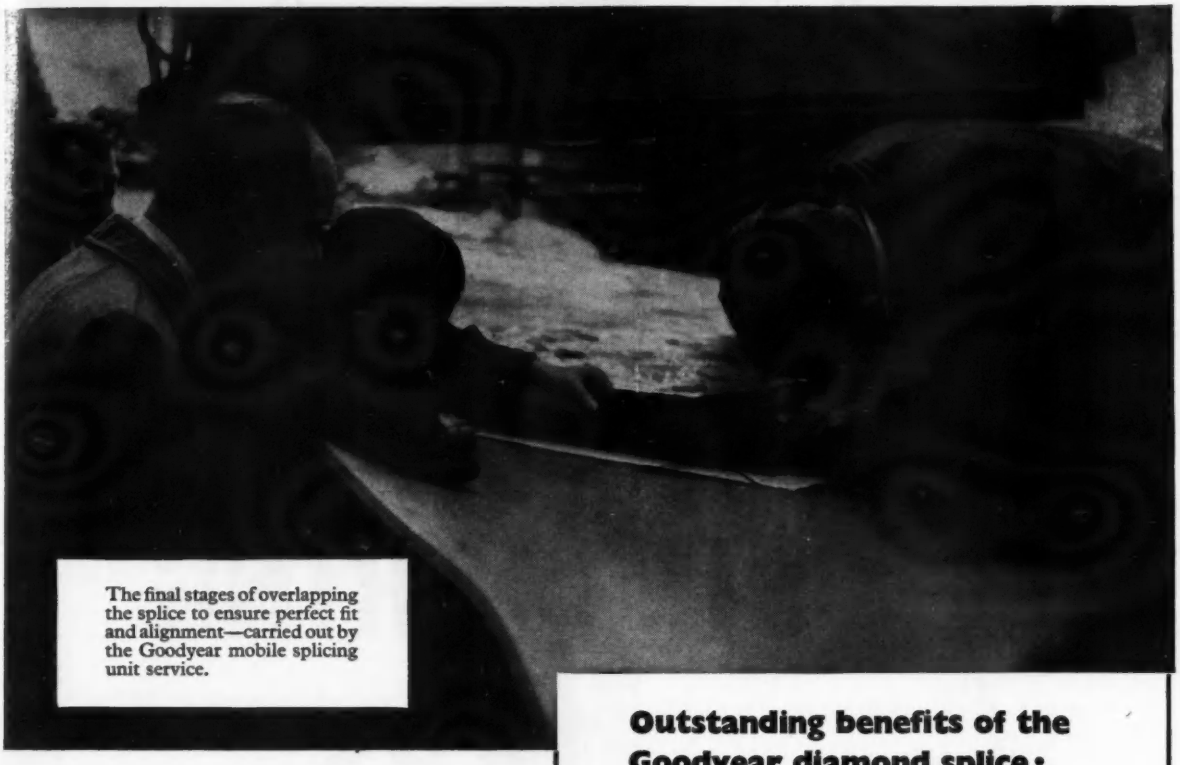
From brooder to oven, the chicken is the 'star' turn of this show and it is worth remembering that today chicken is no longer a luxury dish, for in price it compares favourably with many cuts of meat and provides a welcome variety to the household meals. This being so, it was not surprising to find that the 'Chicken in the Kitchen' exhibit was again in evidence. This consisted of three—in certain previous years only two—demonstration kitchens in which new ways of cooking poultry were demonstrated. Gas and electricity sponsored two of the kitchens, while the third was intended to show how the rural housewife whose house was without mains gas or electricity, could obtain efficient service from bottled gas, an electricity generator, paraffin heater, and so on. The cooker, by the way, was a Radiation range, and this manufacturer had the distinction of having a similar appliance (for town gas, of course) included in the Gas Council's demonstration kitchen. Here Mrs. Joan Robbins, the well-known television house-craft expert and Chief Home Service Adviser to the North Thames Gas Board, demonstrated some of her special recipes. Dishes demonstrated included grilled chicken, new ideas for serving the remainder of a bird, hot or cold, as well as some attractive sweets made with eggs. Roast goose was also on the menu and there followed a lesson in carving from Perraccini, chef of the Brasserie at the Cafe Royal.

The exhibition catered for poultry keepers as well as housewives and an interesting exhibit to both large and small poultry breeders, not forgetting the back garden keeper, was a new Maywick gas-operated radiant heat chicken brooder. No matter what the outside temperature is, this 'black heat' burner, by means of a shallow canopy of reflectors, directs the warmth downwards and keeps the interior of the brooder at a constant temperature. The heat can be thermostatically controlled and the appliance is designed so that it can be raised or lowered to the height required during rearing. The birds grow quickly and uniformly and rearing losses are reduced to a minimum. A batch of 500 chicks reared in this type of brooder resulted in no more than 1% loss. With the growing demand for broilers (chickens for grilling) this brooder is particularly suitable for their quick production.

The rest of the stand was devoted to a range of domestic gas equipment, with particular emphasis on small portable cooking appliances. The overall effect was pleasing but, in our view, not as attractive as that of the E.D.A. section.

DIAMOND SPLICING MOST USED METHOD

—GIVES STRONGEST JOINT



The final stages of overlapping the splice to ensure perfect fit and alignment—carried out by the Goodyear mobile splicing unit service.

DIAMOND SPLICED **GOODYEAR** BELTING

The diamond splice, developed by Goodyear, is recognised as the most satisfactory method of joining conveyor belting yet devised. It has established an undeniable superiority over other methods of splicing.

Installing a Goodyear conveyor belt, made virtually endless by the Goodyear Diamond Splice, is the surest way of lowering the cost per ton. To back up their recommendation of splicing, Goodyear operate a mobile splicing unit. This service is staffed by a team of craftsmen, equipped to carry out on-the-spot splicing anywhere. Furthermore, specialists—each familiar with the problems of a particular branch of industry—are available at Wolverhampton to assist or advise you in the choice, installation, maintenance or repair of Goodyear Industrial Rubber Products. For further information write direct to Dept. B.5, The Goodyear Tyre & Rubber Co. (G.B.) Ltd., Wolverhampton.

Outstanding benefits of the Goodyear diamond splice:

1 *Complete freedom from tearing or pulling out.*
2 *No gaps through which to spill fines.*
3 *There is no tendency for the ends to drift while vulcanizing the joint; the belt is in perfect alignment.*
4 *At any cross section through the splice, only a small part of a single ply is lost to tension, resulting in high joint efficiency.*
5 *Greater strength at the joint frequently makes it possible to reduce the number of plies, increasing the flexibility of the belt and reducing its cost.*
6 *The Goodyear method ensures even distribution of tension at the belt ends, which is much more important than the strength of the splice in straight tension.*
7 *The diamond splice gives a smooth joint, with no impact on pulleys, idlers and scraping devices.*
8 *Fastener bending stresses are avoided, and the belt wraps the pulleys as closely at the splice as at any other point.*
9 *Heat deterioration of the belt, due to fasteners, is eliminated.*

GOODYEAR

INDUSTRIAL RUBBER PRODUCTS

CONVEYOR BELTING · V-BELTS · TRANSMISSION BELTING · INDUSTRIAL HOSE

a new feature
of the Century Cooker

now fitted with SIMMERING TAPS

Yet another important selling feature is added to the popular Century Cooker . . . now, all four boiling burners are fitted with simmering taps. This easy and accurate control of the burner flames will be appreciated by every housewife.

The new taps are simple to use—there are no visual markings to which they must be set. Once the gas is alight it is simply a matter of turning the tap in an anti-clockwise direction to the fixed stop, and the burner flames are set for perfect simmering.

And, of course, all taps on the Century are safety-type and must be pushed in before they can be turned on.

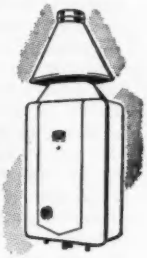
MAIN No. 20 CENTURY GAS COOKER

C 19

Note the name-made by MAIN

R. & A. MAIN LIMITED
Gothic Works, Edmonton, N.18 and Gothic Works, Falkirk

there is a MAIN water heater for every domestic purpose . . .

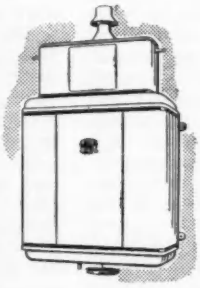


instantaneous for a complete household service . . . the M.I. Multipoint

instantaneous for the bath . . . the New Junior

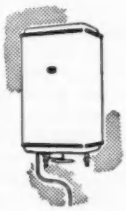
instantaneous or storage

for a complete household service . . . the G.L.C. Circulator



storage for a complete household service . . . the Thermain No. 15

storage for the sink or lavatory basin . . . the Thermain No. 2



MAIN WATER HEATERS Ltd.
Gothic Works, Thornton Rd., Croydon, Surrey
W13

WESTERN JUNIORS' RED LETTER DAY

Bath was the scene of an eventful day in the annals of the Western Junior Gas Association on December 4, when Mr. C. H. Chester, C.B.E., Chairman of the South Western Gas Board, presented the Association with a Presidential badge of office. In the morning, at Forts Restaurant, Mr. Chester gave a luncheon to the past Presidents, the senior members of his staff, and the Council members of the Association. The occasion was also honoured by the presence of Mr. W. K. Tate, President of the Institution of Gas Engineers, and Dr. W. T. K. Braunholtz, the Secretary.

Mr. Chester, in proposing the toast to the past Presidents, said how pleased he was to see all but three of the past Presidents at the luncheon. Two of them had passed on and Mr. J. H. Dyde, the third missing member, had been very disappointed at being unable to attend. The speaker thought it gratifying that so many of the past Presidents were still with them, and went on to recall that he had been a President of the Yorkshire Juniors; he was very pleased to have at the same table Mr. F. Heathcote, a past President of the Yorkshire Junior Association. Mr. Chester praised the work of the past Presidents in keeping alight the torch of the junior movement through the years.

Dr. Arthur Marsden replied for the past Presidents, although he thought Mr. C. P. Bateman ought to be doing the job, since he was the first President of the Association. In his speech, Dr. Marsden paid tribute to Mr. Dyde, who was unfortunately absent, for his valiant work in the educational field of gas engineering.

Mr. F. G. Craxford, the President of the Western Juniors, in proposing the toast to the Institution of Gas Engineers, thanked Mr. Tate for supporting him on this occasion. Membership of the Institution was the hallmark of every gas engineer, said Mr. Craxford, and much of the good work of the Institution was done behind the scenes, among the various technical committees and panels, guided so ably by Dr. Braunholtz. The Western Juniors were proud to number one of its members among the list of distinguished gentlemen who had been Presidents of the Institution.

Mr. W. K. Tate, in reply to the toast, expressed his conviction that the junior movement had a great and important part to play in the education of the young gas engineer, providing, as it did, a platform on which he might try out his oratorical wings, and giving opportunity for free discussion of many subjects and problems.

The last toast, that of the South Western Gas Board, was proposed by Mr. A. Tran, of the Southern Gas Board, a past President of the Western Juniors, who expressed pleasure at the opportunity of being among friends in Bath again. Mr. Tran spoke of the great schemes of integration which had been completed and were still being carried out, in the South West. He referred to the last year's report as a wonderful record of work achieved by an able team, so energetically led by Mr. Chester.

Mr. C. H. Chester, Chairman of the South Western Gas Board, presents the presidential badge to Mr. W. New, Past President of the Western Juniors. Watching the ceremony are Mr. W. K. Tate, President of the Institution of Gas Engineers, and Mr. F. G. Craxford, President of the Western Juniors.

Mr. J. Carr, Deputy Chairman of the Board, replied to the toast, and referred to the paper to be given in the afternoon on 'Human Relations.' Mr. Carr said how necessary it was to have a real personal understanding with all employees, and recalled how, when he first came to Bristol, he set out to get to know the names of all his employees, so that he might always refer to them by name. This kind of approach to the problem of personal relations was sure to create better understanding between management and employee.

The afternoon meeting was held in the demonstration room at Bond Street, where 95 members gathered with some 17 visitors to witness the presentation of the Presidential badge of office, by Mr. C. H. Chester.

Mr. Chester, in making the presentation, reminded the members that Mr. New (Plymouth), immediate past President, was receiving the gift on behalf of the Association, because it was during his year of office that the suggestion that such a gift should be made, originated. The badge of office took the form of a medallion depicting the South of England, with the area of the South Western Gas Board shown in contrasting colour. The medallion was suspended on a blue silk ribbon, on which were fixed gold bars indicating the names of the 23 past Presidents.

In thanking Mr. Chester for this beautiful gift, Mr. New said he knew the donor had given a good deal of thought to the appropriateness of the medallion, and he was sure that all who saw it would agree that it was a very fine piece of craftsmanship. Mr. New then passed the badge of office to the President, Mr. F. G. Craxford, who said he was proud to be the first President in office to wear it, and he knew that it would always be a source of pride and pleasure to those who occupied the Presidential chair. Mr. Craxford added his thanks to those of Mr. New for Mr. Chester's gift, which was an expression of his continued interest and support of the juniors.

Mr. Craxford then announced that the Council of the Association together with all the past Presidents wished to mark this historic occasion by a gift to the Area Board Chairman. He then asked Mr. Chester to accept a Sheraton writing desk as a token of esteem from the members and past Presidents of the Association. The desk contained a drawer in which had been fixed a plate suitably inscribed to indicate the donors and the occasion of the gift.

Mr. Chester thanked the Association, and said he considered it would become a family heirloom. He once again reaffirmed his confidence in the gas industry, where, he said, there was plenty of room at the top for the right men.

Mr. W. K. Tate then presented the Honorary Members' Prizes to the following:—1st prize: L. R. Jones (Bristol) for his paper 'Some Aspects of Instrumentation; 2nd prize: W. E. Baggs (Bath) for his paper, 'Some Aspects of Accountancy.'

Dr. K. Duncan (Medical Officer to the Board) then introduced his paper entitled 'Human Relations in Industry—A Midsummer Night's Dream or As You Like It.' The speaker said the paper started as a frolic, but they soon found that in that light they could not do justice to their subject.

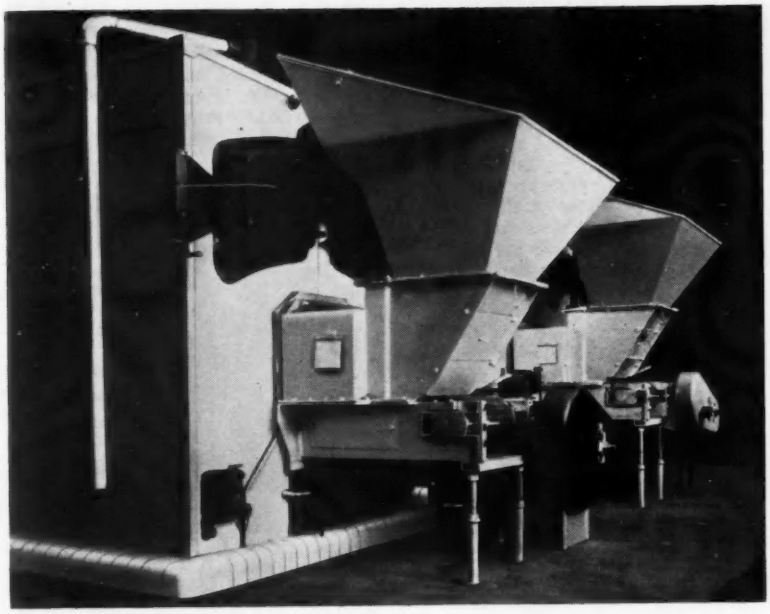
The paper will be published in a later issue of the 'JOURNAL.'

WOODSIDE STOKER WORKS PRESS VISIT

Edwin Danks Whirlwind Tour

Handled entirely by the firm's publicity department, Babcock & Wilcox, Ltd., organised a Press visit for 35 trade and technical pressmen to the Woodside Stoker works of Edwin Danks & Co. (Oldbury), Ltd., and two of their installations on December 2. Leaving London early in the morning, the party returned from Birmingham in the evening, after a full and comprehensive day.

First—and main—item on the programme was a tour of the Woodside Works, which covers a site area of about 9½ acres and employs 55 people. This is not a large works as modern engineering works go, but the product, explained the Company, 'does not call for a very large works, nor for the intensive application of mass production principles.' The chain grate stoker is, in fact, produced as a combination of mass production and batch production.



'Minor' stokers in Woodside Works fitted to 'Ideal' 13K and Beeston 'Colonel,' boilers, both rated at 2,250,000 B.Th.U. per hour.

In a brochure specially prepared for the occasion, the Manager of the Stoker Division of Edwin Danks, Mr. C. H. G. Hayward, spoke of the importance of the chain grate stoker in the national fuel policy. There were still about 40,000 hand-fired boilers in existence, and this involved the supply of graded fuels.

Continued Mr. Hayward: 'If ungraded fuels must be accepted, which nowadays so often is the case—the results will be loss of boiler capacity and excessive smoke emission. The chain grate stoker is, in fact, the only method available to deal with these fuels and obtain full boiler load.'

The visitors saw the manufacturing sequence of a stoker. First, the welded chassis assembly is fitted with the air connecting duct and placed on a special trolley upon which it is moved around as required by an electric truck. The internal dampers and air seals and the driving shaft are then fitted and the unit is wheeled to the chain-making table and the chain grate made up and pulled into position. The driving gear assembly is then added, after which the hopper sub-assembly is fixed into position. Ash plates, bearer bars and side seals are then added, and the unit goes for painting and a 16-hour running test.

After lunch, at the Station Hotel, Dudley, the boiler installation at Tubes, Ltd., were inspected. This installation consists of two Edwin Danks high velocity economic boilers, each rated at 6,000 lb. steam per hour and each fitted with a single Oldbury stoker. Unusual is the fact that the Oldbury stokers were supplied some three years after the boilers first went into operation, on account of troubles experienced with firing low grade fuel. The boilers had previously been operating on double-screened nuts, but were then supplied with East Cannock unwashed slack, and the Oldbury stokers were installed to deal with this.

Working to a tight schedule, the party was then whisked away in its coach to Frederick Smith's Brewery, Ltd., where a boiler installation had been installed in January, 1948. This replaced some small boilers which were proving inadequate for their task. It has been estimated that a well-run brewery may use something like nearly 200 lb. steam for each barrel of beer produced—including all purposes such as space heating, cask washing, etc. Furthermore, the steam load may remain at a maximum value for periods of four to eight hours per day. The boilers are Edwin Danks Lancashire type, 30 ft. long by 8 ft. 6 in. diameter, rated at 11,000 lb. per hour, and each has two Oldbury stokers of standard design.

Their usual fuel is a mixture of ¾ in. Tamworth washed slack (12½% ash) and Birch Coppice washed beans (6½% ash). But upon occasion they have burnt stuff as poor as the fines from pit mound slack, without any trouble and without making smoke.

After tasting some excellent bottled light ale of a quality that would leave even the exacting Mr. Geoffrey Bing, M.P., satisfied, the pressmen left for their train on which, in their reserved carriage, they were entertained to dinner.

North of England Section

A meeting of the North of England Section of the Institution of Gas Engineers was held at the Cleveland Scientific and Technical Institution on November 25. The meeting was attended by two of Her Majesty's Inspectors of Factories. The meeting was opened by the Chairman, Mr. W. R. Garrett, and there followed a welcome to the Middlesbrough area by Mr. J. W. Pallister, Divisional General Manager of the Tees-Side Division.

The Chairman spoke with regret of the death of Mr. Arthur Clement Hovey, and reminded members that he was a President of the North of England Gas Managers' Association in 1932-33. He also paid tribute to Mr. Hovey's work, not only for the District Section, but for the forerunner of the Northern Junior Gas Association—*i.e.*, the Auxiliary Section of the North of England Gas Managers' Association. The members stood to order as a token of respect for Mr. Hovey.

A paper on 'The Fundamental Arrangements for Safety on Gasworks' was presented by Mr. J. E. Dixon and Mr. W. Cummings. The paper and the discussion will be published later.

A vote of thanks was proposed by Mr. W. Sutcliffe, to which Mr. Dixon briefly replied.

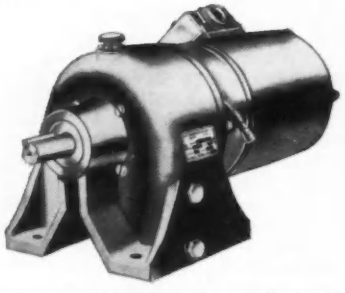
A Gas Point to facilitate the use of a gas poker is to be laid to the grate in the living room of the houses in a new scheme at Gracemount, Edinburgh. This is because a condition of tenancy may be the burning of smokeless fuels as the site is in an area suggested as a smokeless zone. The type of grate installed is suitable for burning smokeless fuels, but a decision on whether this will be compulsory has been deferred by the Corporation until the houses are nearer the stage of occupation.

TRADE NEWS

Geared motors and speed reducers

Two new types of foot mounting and flange mounting fractional geared motors and speed reducers have now been added to the standard range of larger industrial units made by Electropower Gears, Ltd. Known as types ESR50 and ESRV50 these new units have a maximum torque at 12 r.p.m. of 24.6 ft. lb. In certain cases slower speeds are obtainable and the units are also available as a two-speed geared motor. The maximum standards ratio is 116.8-1; the minimum is 2.56-1. Gear wheels, pinions and shaft are manufactured from high tensile steel. The output shaft is fitted with ball bearings, while the first gear, second pinions and intermediate gear and final pinion revolve on fixed steel lay-shafts, the pinion being fitted with phosphor bronze bushes.

These units can be mounted in practically any position although the exact position should be stated on the order, say the makers.



The gearbox is self-contained, the motor being bolted on by four bolts after assembly. Motors of the three-phase, single phase D.C. variable speed commutator, protected or totally-enclosed, types complying with the usual British Standard Specification can be fitted. Units can be supplied suitable for Canadian and American Specifications.

A high speed shaft can be brought out at the back end of the motor, if required. Oil seals are fitted to the final shaft and motor flange shaft. The units can be supplied as self-contained speed reducers with input flange and shaft suitable for driving by flexible coupling or belt drive. Silent in operation, they are suitable for fitting to all types of machinery.

The illustration shows the ESR50 horizontal unit with motor.—*Electropower Gears, Ltd., Kingsbury Works, Kingsbury Road, London, N.W.9.*

Stress corrosion cracking

Arising out of a recent survey of 67 gasworks installations where stress-corrosion cracking had been reported, a committee of the British Welding Research Association, although still awaiting the final analysis of the reports, believe that certain conclusions are justified. They are:—

(*a*) Stress-corrosion cracking is not limited to welded gas mains, but appears, though less frequently, in welded vessels.

(*b*) Its appearance has been found to be not related to any group of coals or any types of carbonising plant. No cases connected with water gas are known, and producer gas is not seriously suspected.

(*c*) The range of expected occurrence is now extended to include the foul main and terminate at the outlet of the final ammonia washers.

(*d*) Stress relief, by heat treatment, to a not unduly exacting specification, is apparently able to prevent its appearance entirely, and probably also to meet the effects of added strains such as arise from mechanical vibration, ground movement, etc., if these are not excessive. Shot peening has not been tested with equal thoroughness.

(*e*) Previously stress-relieved work should not be rewelded for alterations without afterwards restoring the stress relief.

(*f*) High quality of welding does not confer immunity, and there are some doubts in regard to riveted work being completely resistant.

The interim report conveying these conclusions has been circulated to the authorities directly interested in the manufacture of coke and gas, says the Association.

The metallurgical laboratories of the Association held 'open days' on November 23-25, at which many hundreds of members and guests were able to see some of the recent work of the Association dealing with the welding of ferrous and non-ferrous alloys.—*British Welding Research Association, 29, Park Crescent, London, W.1.*

Diffuse reflection glass

Ordinary clear glass for instrument dial covers sometimes leaves a lot to be desired in service due to the incidence of reflection from the glass. Because of the glare from the lighting points, or wrong positioning of an instrument panel in relation to windows, the clear glasses have a mirroring effect, often making it impossible to read the dials at certain angles. And changing of position in order to read the dials correctly may not always be possible.

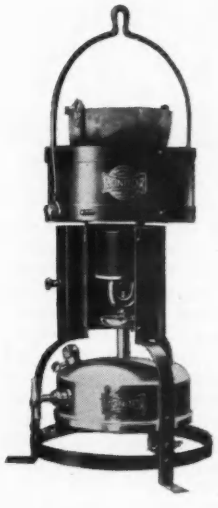
After a long series of experiments, Pilkington Brothers, Ltd., have produced a glass with both surfaces lightly obscured which, they claim, successfully mitigates the nuisance of reflection without actually reducing the amount of light reflected. It is available in substances 2.6/3.2 mm. and upwards, and at present in sizes up to 18 in. × 12 in., and can be obtained toughened if required. Bent glass to approved curves is available as well as flat glass.

The glass is said to be particularly suitable for meter and gauge glasses where the observer is positioned at some distance from the instrument panels and is unable to move into a position to avoid reflections. The glass only functions satisfactorily so long as the dial face of the instrument is reasonably close behind the glass.—*Pilkington Brothers, Ltd., St. Helen's, Lancs.*, or *Selwyn House, Cleveland Row, St. James's, London, S.W.1.*

Monitor blast furnace

The new Monitor paraffin burning blast furnace has been adapted from the well-known range of paraffin stoves to provide an easily transportable and simply operated unit for general industrial use. It is especially suitable for melting lead. Provision has also been made for heating bars, pipes, etc., up to 1 in diameter. It might also be of interest to the distribution side of the gas industry where melting of metal is called for in the running of socket and spigot pipes.

The apparatus consists of a pressure stove with seven pints fuel capacity held in a strong steel framework with heavy gauge sheet steel casing acting as a funnel round the burner. Access to the burner for lighting, cleaning and inspection is obtained by a handy door opening in the funnel itself. Over the



funnel is the pot rest which is designed to give support to a wide range of melting pots without changing any parts. A wrought iron bail handle is fitted on the pot and when lowered forms a rest for bars, etc.

Pipes can be melted or bent by placing them through a special aperture in the pot rest itself.

It is claimed that the furnace will melt 28 lb. of lead in just over six minutes, working at full pressure.

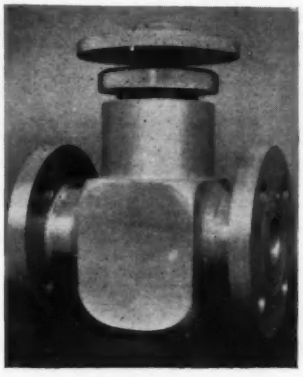
Total weight of the furnace is 32 lb. with a two pint melting pot (28 lb.

capacity), which is included. Total height with handle down is 21½ in. With a capacity of seven pints of paraffin, the furnace is said to use 4.30 pints per hour, working at 40 lb. per sq. in.

Now on the market also is a range of burner stoves designed for heavy duty industrial purposes, where intensive heat is required for bulk water heating, melting metal or heating rivets. These are constructed of heavy gauge non-porous brass and will give years of satisfactory use. A special safety valve is incorporated.—*Monitor Engineering and Oil Appliances, Ltd., of Stechford, Birmingham, 9.*

Cobex plastic valve

The availability of rigid vinyl plastics in block form has opened up great possibilities in the design and manufacture of valves. Hitherto, valve bodies were made from thin sheet pressed to the required shape and seam welded.



The valve shown in the photograph is machined from solid Cobex and is extremely robust. Excluding packing, the valve comprises five parts only; the body, spindle, gland-nut, handwheel and handwheel nut. The flanges are screwed and welded to the body, the generous proportions allowed giving ample strength. The spindle incorporates a special inlaid portion at the seating end which can be renewed when excessive wear has occurred. All the valves are tested to 80 per sq. in., but can withstand considerably higher pressures. This type of valve is at the moment available in sizes from ¼ in. to 2 in., and it is hoped to increase this range in the very near future. It is intended for efficient handling of corrosive liquids.

The Cobex valve is in standard production by *Tanks and Linings, Ltd., Droitwich,* and it is a new application of Cobex rigid vinyl manufactured by *B.X. Plastics, Ltd., Larks Hall Road, London, E.4.*

Gem Brushes (Luson), Ltd., announce their recent acquisition of the Kingswood Manufacturing Co., Ltd., Letchworth, Hertfordshire. 'Rotopol' rotary polishing and lathe brushes in fine wire, bristle, fibre and calico, will thus be added to the list of 'Gem' brushes already available to industry.—*Gem Brushes (Luson), Ltd., Minerva Road, Park Royal, London, N.W.10.*

Shell stage Epikote resins exhibition

In the Grand Hall of the Criterion Restaurant in London's Piccadilly last week, Shell Chemicals, Ltd., put on a smart exhibition of the practical uses of Epikote resins. The applications were either incorporated in surface coating formulations or in the fields of plastics or adhesives.

Shell do not make Epikote based finishes, but are suppliers of the resins to other formulators.

Epikote resins are produced synthetically from two chemicals, of the type known to industrial chemists as epoxide or epoxy resins. The Shell Group, pioneers in the production of chemicals from petroleum, say that one of the chemicals is an intermediate product of glycerine manufacture.

Production of these resins began in the United States in 1949 and is now running at about 11,000 tons per annum.

Epikote uses

At present the main outlet for these resins is in surface coatings including paints, lacquers, stove enamels, varnishes and printing inks but, the Exhibition demonstrates, they have practical application as casting and laminating resins.

Shell set out to prove in their demonstrations that in surface coatings Epikote resins combined qualities of adhesion, flexibility, toughness and resistance to chemicals to a degree which was impracticable before to achieve in one finish. 'Earlier synthetic resins,' they say, 'made it possible to formulate coatings with some of these qualities; Epikote based formulations can have them all at the same time.' Although derived from petroleum the characteristics of the raw material are completely changed in the process involved. Thus neither the resins nor the coatings made from them are inflammable in the nature of petroleum; the fire risks with these coatings are considerably less than with nitro-cellulose lacquers, it is claimed.

Dearer than alkyds

But these resins will probably always tend to be dearer than the alkyds and other resins currently in use because the cost of the raw materials is high. Sometimes, however, the necessity for comparatively fewer coats will balance the extra cost.

In the domestic equipment section of the exhibition, washing machines were shown where Epikotes had been used either as an entire exterior coating or as a primer. They were claimed to resist soap and synthetic detergents. Also, they had been used as a primer on an Electrolux refrigerator.

For structural engineering and building, the chief contribution Epikotes make apparently is in anti-corrosive paints. One is told that they are already proving their ability to increase substantially the period normally elapsing between repaints even under particularly arduous conditions. Their successful use in paints for concrete gives rise to interesting possibilities.—*Shell Chemicals, Ltd., Norman House, 105-109, Strand, London, W.C.2.*

Trade Publications

How long will it last?

Interest in aluminium as a building material has grown rapidly in the last few years, and the question of durability or 'how long will it last?' is one that is often raised. A publication by the Northern Aluminium Co., Ltd., Banbury, Oxfordshire, explains how exposure to the weather affects aluminium and gives evidence—consisting of long-term exposure test results and actual case histories—of the metal's behaviour in various conditions.

The Company says that since the war, experience and knowledge of aluminium's behaviour have advanced at such a rate that it is now possible to make a thorough appraisal of its durability. The booklet is freely available on application.

Steel castings

A booklet on Steel Castings, recently produced by the North British Steel Foundry, Ltd., has been designed not only to function as a catalogue but also to provide a source of reference for the buyer of steel castings. It contains notes on the design of a steel casting as it relates to the actual process of casting steel, a set of tables covering British Standard Specifications for steel castings in carbon and low and medium alloy steels with their U.S. equivalents, and notes upon the procedure to be followed in the placing of enquiries and orders for steel castings. The Company's head office and works is at Bathgate, near Edinburgh, in Scotland.

Safety and efficiency

British Engine Boiler & Electrical Insurance Co., Ltd., has, since their inception, been engaged in the periodical inspection and testing of power plant and kindred machinery. The range now covered includes gasholders, boilers and pressure vessels, engines, turbines, compressors and pumps, and lifts and cranes.

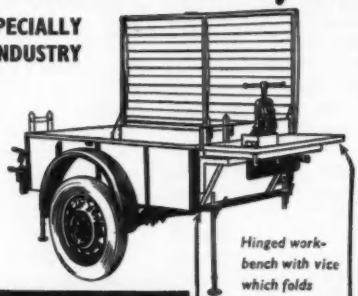
Technical Report—new series Volume II—follows closely on the lines of the previous one, which comprised a selection of interesting service failures that had been investigated. Priced 12s. 6d. the Report may be obtained from the Company at 24, Fennel Street, Manchester 4.

Take your workbench with you

ON A PRATT TRAILER SPECIALLY DESIGNED FOR THE GAS INDUSTRY

This latest addition to the range of PRATT trailers embodies all the recognized qualities of the other models...sound design and construction, strength at minimum weight, excellent springing, stability, good carrying capacity.

WRITE FOR DETAILS

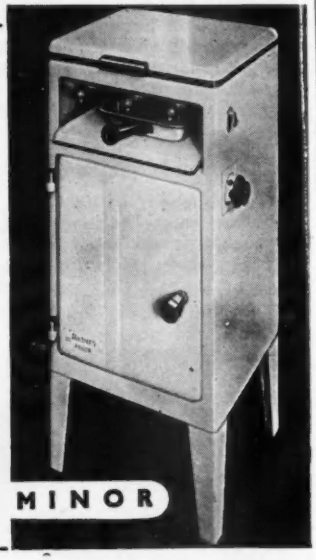


Hinged workbench with vice which folds into body when travelling or not in use.

THE PRATT ENGINEERING COMPANY
NORTHALLERTON, YORKS. TELEPHONE: NORTHALLERTON 142

BIG Capacity for LITTLE Kitchens

Especially suited to the kitchens of flats and small houses, this highly efficient cooker provides utmost cooking capacity in the least possible space. Cast iron construction ensures strength and durability and reduces maintenance costs to a minimum, thus making the Dainty Minor particularly suitable for simple hire or hire purchase.



Approved and adopted by leading gas boards

The **Dainty** MINOR

R. RUSSELL & SONS, LTD., DERBY
Agents for Scotland and Northern Ireland:
JAMES R. THOMSON & CO. LTD., 41, YORK STREET, GLASGOW, C.2

CASES FOR BINDING

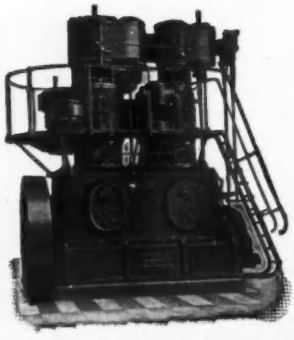
Quarterly Volumes of the 'Gas Journal'

7/6 each, post free

Walter King, Ltd., 11, Bolt Court, Fleet Street, London, E.C.4.

COMPRESSORS
& DRY VACUUM PUMPS FOR AIR OR GAS.

* * *



These double-acting cross-head type Compressors are provided with forced lubrication. They may be driven by any suitable power unit, as shown below, or by steam cylinders in tandem with the compressor cylinders making a self-contained unit, as shown on the left.

Single Stage. Pressures up to 40 lbs. per sq. in.
Capacities up to 10,000 cu. ft. per min.

Two Stage. Pressures up to 120 lbs. per sq. in.
Capacities up to 5,000 cu. ft. per min.

For particulars of these machines and for other types write (mentioning this journal) to:—

REAVELL & Co., LTD.,
Ranelagh Works, Ipswich.

Telegrams: "Reavell, Ipswich." Telephone Nos. 2124 & 2125 Ipswich.

PUBLISHERS' NOTICE

The "Gas Journal" is published every Wednesday, price 1/3d.; by post 1/5d.

Subscription Rates: Home and Empire:—52/- per annum; Foreign:—60/- per annum. (Both payable in advance.) A copy of the "Gas Journal" Calendar & Directory is presented each year to continuous subscribers.

Classified Advertisements: All small classified advertisements are charged at 1/9 per line (approx. 7 words)—minimum charge 10/6. A Box Number address occupies 2 lines, and a further 6d. is charged towards cost of postage on replies. Copy must be received by first post on Monday to ensure insertion in that week's Journal.

Displayed Advertisements: Rates obtainable on application to the Business Manager. Change of copy for displayed spaces must be received 14 days prior to publication if proofs are required. Type area of inside pages 10 in. deep × 7 in. wide; block screen 120.

BUSINESS MANAGER: S. T. CULLEN

MIDLANDS MANAGER: G. B. Torrance, 42, Wychall Lane, King's Norton, Birmingham, 30. *Telephone:* Kings Norton 3868

NORTHERN MANAGER: Philip W. B. King, Flat 1, 7 Langcliffe Avenue, Harrogate. *Telephone:* Harrogate 67625.

SOUTHERN REPRESENTATIVE: A. Engelhardt, 11, Bolt Court, Fleet Street, E.C.4. *Telephone:* Central 2236-7

WALTER KING, LTD., 11, Bolt Court, Fleet Street, London, E.C.4.

Telephone: CENtral 2236-7. *Telegrams:* Gasking, Fleet, London.

Christmas Holidays

Our printers will be closed for four days over Christmas, and we would advise our readers and advertisers that, in consequence, the "Gas Journal" and "Gas Service" Offices will close on Friday evening, December 24, and re-open on the morning of Wednesday, December 29.

MANUAL OF GAS FITTING

by R. N. Le Fevre

Reprint Edition now with the Binders.

Orders already to hand will be despatched in the next few weeks.

PRICE **30/-** inc. postage.

WALTER KING, LTD., 11, BOLT COURT, FLEET STREET, LONDON, E.C.4.

OXIDE

DUTCH AND DANISH BOG ORE SPECIALLY ACTIVATED OXIDE OF IRON

Oxide supplied on loan or sale outright. Highest prices paid for Spent Oxide

Send your enquiries to

GAS PURIFICATION & CHEMICAL COMPANY LIMITED

ESTABLISHED 1873

PALMERSTON HOUSE, BISHOPSGATE, LONDON, E.C.2.

Telegrams: "Purification, Stock, London." Telephone: London Wall 5077

FIRE!

IN THE TROPICS THEY USE

NU-SWIFT!

Hot and humid conditions test fire extinguishers severely. Corrosion threatens, metals expand and contract. Reliable Nu-Swift remains reliable under trying conditions.

Nu-Swift Ltd., 25 Piccadilly London W.1. REG 5724

In Every Ship of the Royal Navy

ROOK BROS. LIMITED

FOR—

Every aspect and requirement connected with the

STRUCTURAL STEELWORK

of

GASHOLDERS

and

GASWORKS PLANT

ENQUIRIES INVITED:

32, Collier Row Lane, ROMFORD, Essex.
Tel.: Romford 5174

"KLEENOFF" *

THE COOKER CLEANER

"KLEENOFF"

FIBRE BRUSHES
RUBBER MOPS

"KAY-DEE" *

KETTLE DESCALER

For resale to the public, and in bulk for works use.

BALE & CHURCH, LTD.

7, CROMPTON WAY, CRAWLEY, SUSSEX

APPOINTMENTS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive or a woman aged 18-59 inclusive unless he or she, or the employment, is excepted from the provisions of the Notification of Vacancies Order, 1952.

BALFOUR'S of Leven have a vacancy for a Leading Design Draughtsman. In addition to a good knowledge of Gas Works Plant, it is essential for applicants to hold a qualification in Structural or Mechanical Design. The position carries a good salary and offers prospects of advancement. A pension scheme is in operation.

Applications, giving full particulars of training and previous employers, should be made to the Personnel Officer, Henry Balfour & Company Limited, Leven, Fife.

NORTH EASTERN GAS BOARD

BRADFORD GROUP
WORKS CHEMIST

APPLICATIONS are invited for the position of WORKS CHEMIST in the Bradford District at a salary within Grade A.P.T. 8 (Provincial 'A') (£625-£705 per annum) of the Scales agreed by the National Joint Council for Gas Staffs.

Applicants should have completed their National Service, and in addition to possessing a sound practical and theoretical knowledge of chemistry, should have practical experience of gas manufacture.

The successful applicant will be required to pass a medical examination and to participate in the Board's Staff Pension Scheme.

Applications, giving full details of age, education, qualifications and experience, should be forwarded to the Group General Manager, North Eastern Gas Board, Bradford Group, Britannia House, Bradford, to be received by him not later than December 29, 1954.

J. C. GARDNER,
Secretary.

Bridge Street,
Leeds, 2.
December 11, 1954.

(*Classified advertisements continued on page 764*)

APPOINTMENTS VACANT (ctd.)

WEST MIDLANDS GAS BOARD

WALSALL AND DISTRICT DIVISION
DEPUTY DIVISIONAL ACCOUNTANT

APPLICATIONS are invited from qualified Accountants for the above position.

Candidates should have had extensive practical experience in finance and accountancy, preferably in Connection with a public utility, including the preparation of financial and cost accounts.

The salary will be £925 × £50—£1,125 per annum.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications, stating age, qualifications and experience, together with details of present and previous appointments and the names of two referees, should be addressed to the Industrial Relations Officer, West Midlands Gas Board, 6, Augustus Road, Edgbaston, Birmingham, 15.

WEST MIDLANDS GAS BOARD

ASSISTANT INDUSTRIAL GAS OFFICER

APPLICATIONS are invited from suitably qualified persons for the above appointment.

The duties include supervision of the technical and development work being carried out in the Department, and the co-ordination of the work of Divisional staffs. A wide experience of fuel utilisation is necessary and a University degree or qualification in Fuel Technology is desirable.

The salary will be not less than £1,300 per annum.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications, stating age, experience and qualifications, together with the names of two referees, should be addressed to the Industrial Relations Officer, West Midlands Gas Board, 6, Augustus Road, Edgbaston, Birmingham, 15.

WEST MIDLANDS GAS BOARD

SHROPSHIRE DIVISION
RESIDENT GASFITTER—SHIFNAL

THE successful applicant will be responsible for carrying out District maintenance and fitting work, and duties as required in connection with Shifnal Distribution Station.

Wages will be in accordance with Area Joint Industrial Council rates, Provincial Grade 'A'.

The successful applicant will be required to reside in the Board's house at Shifnal, for which a reasonable rental will be charged.

Applications, stating age, experience, other personal details, etc., should be addressed to the Engineer and Manager, West Midlands Gas Board, Gas Offices, Market Street, Wellington, Salop, to reach him within fifteen days of the appearance of this advertisement.

DESIGN ENGINEER to take charge of Projects Engineering Department which undertakes the development, layout and design of vessels, structures and plant as part of the preparation of schemes for tenders. The field includes large steel plate structures and particularly tanks, pressure vessels, gasholders and refinery columns, chemical and gas plant, heat exchangers and complete gas, chemical and oil installations. The person appointed must be by experience capable both of organising the work of the department and ensuring that imaginative work is done rapidly. The post requires qualifications at Degree level or at Associate Membership level of the Senior Engineering Institutions and applicants should have held a post where they were responsible for the work of others.

Applications giving full details of education, qualifications and experience to date and present salary, to be sent not later than December 24, 1954, to the Secretary, Whessoe Limited, Darlington.

AN OPENING occurs for a Senior Gasholder Foreman to undertake Supervisory duties including occasional inspection work. The post will be a pensionable staff appointment, and offers prospects of advancement to the right man. Applications giving fullest details of experience and present salary together with references should be made to: No. 218, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

EAST MIDLANDS GAS BOARD

LINCOLNSHIRE DIVISION
RELIEF SHIFT SUPERINTENDENT—LINCOLN

APPLICATIONS are invited for the position of RELIEF SHIFT SUPERINTENDENT at the Bracebridge Works, Lincoln. The grade for the post is A.P.T. 5 (£500-£580) commencing salary being according to age and experience.

Possession of a technical qualification and knowledge of Woodall-Duckham C.V. retorts will be an advantage.

The position is pensionable and the successful candidate may be required to pass a medical examination.

Applications stating age, qualifications, present position and experience, together with the names of two referees, should be addressed to the undersigned to be received not later than Monday, January 3, 1955.

B. CLARKE,
Divisional General Manager.

Belle Vue House,
Carline Road,
Lincoln.

EAST MIDLANDS GAS BOARD

NOTTS AND DERBY DIVISION
NOTTINGHAM UNDERTAKING
APPOINTMENT OF WORKS CHEMIST

APPLICATIONS are invited from suitably qualified persons for the position of WORKS CHEMIST for the Nottingham Undertaking at a commencing salary within A.P.T. Grade 8 (£625-£705) according to age, qualifications and experience.

Applicants should have a sound knowledge of the control of gas manufacture, and be experienced in the carrying out of all the usual gas works tests.

The position is pensionable and the successful applicant will be required to pass a medical examination.

Applications, giving full details and the names of two referees, should be submitted to the undersigned not later than December 29, 1954.

K. L. PEARCE,
Divisional General Manager.

East Midlands Gas Board,
Notts and Derby Division,
P.O. Box 62,
Friar Gate,
Derby.

SCOTTISH GAS BOARD

WESTERN GROUP
GREENOCK, GOUROCK AND PORT GLASGOW DISTRICT
TECHNICAL ASSISTANT

APPLICATIONS are invited for the position of TECHNICAL ASSISTANT at Greenock. The Salary will be within the range of Grades A.P.T. III-VI (£335-£610 per annum) of the National Joint Council for Gas Staffs, Provincial 'A' Scale, with *placing according to qualifications and experience.*

Candidates should possess the Higher Grade Certificate of the Institution of Gas Engineers (Manufacture) or equivalent and have had experience in working of carbonising and ancillary plant.

The successful candidate will be required to pass a medical examination and become a member of the Board's Superannuation Scheme.

Applications, stating age, experience and qualifications should be addressed to the subscriber within fourteen days of publication of this advertisement.

WILLIAM KIRK,
District Manager.

Inchgreen Gas Works,
Greenock.
December 11, 1954.

SCOTTISH GAS BOARD

SOUTH EAST DIVISION
GALASHIELS DISTRICT
TECHNICAL ASSISTANT

APPLICATIONS are invited for the above appointment at the Galashiels District Undertaking at a Salary within Grades A.P.T. 3/5 (Provincial 'A' of the National Scale for Gas Staffs (£335-£580) with placing according to qualifications and experience.

The post is superannuable and the successful candidate may be required to pass a medical examination.

A house is available at a reasonable rent.

Applications, stating age, qualifications and experience together with the names of two referees, should be addressed to the undersigned within fourteen days from the appearance of this advertisement.

G. C. WOOD,
District Manager.

Gas Engineer's Office,
Gas Works,
Galashiels.

WALES GAS BOARD

PEMBROKESHIRE GROUP
HOME SERVICE ADVISER

APPLICATIONS are invited from suitable qualified ladies for the above appointment.

Applicants should possess a recognised qualification in Domestic Science and be fully conversant with the organisation of cookery and other demonstrations.

The successful applicant will be required to work within the Pembrokeshire and Carmarthen Groups and will be based at Pembroke Dock.

The salary will be within Grade A.P.T. 4, Provincial 'B', £256 to £408, commencing salary to be fixed in accordance with experience and qualification but will not be less than £308 per annum.

The person appointed will be required to pass a medical examination and to contribute to the Board's Staff Pension Scheme.

Applications stating age, qualifications, experience and names and addresses of two persons to whom reference can be made, should be received by the undersigned not later than December 31, 1954.

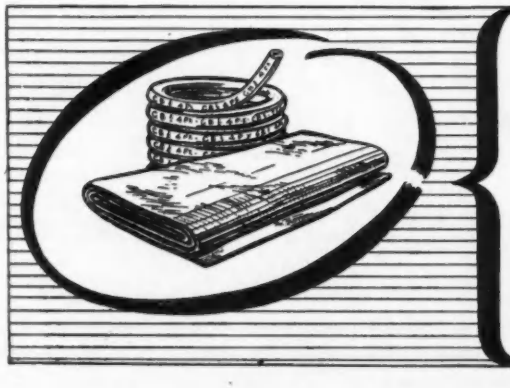
G. A. WILLIAMS,
Convener,
Pembrokeshire Group.

44, Bush Street,
Pembroke Dock.

PATENTS

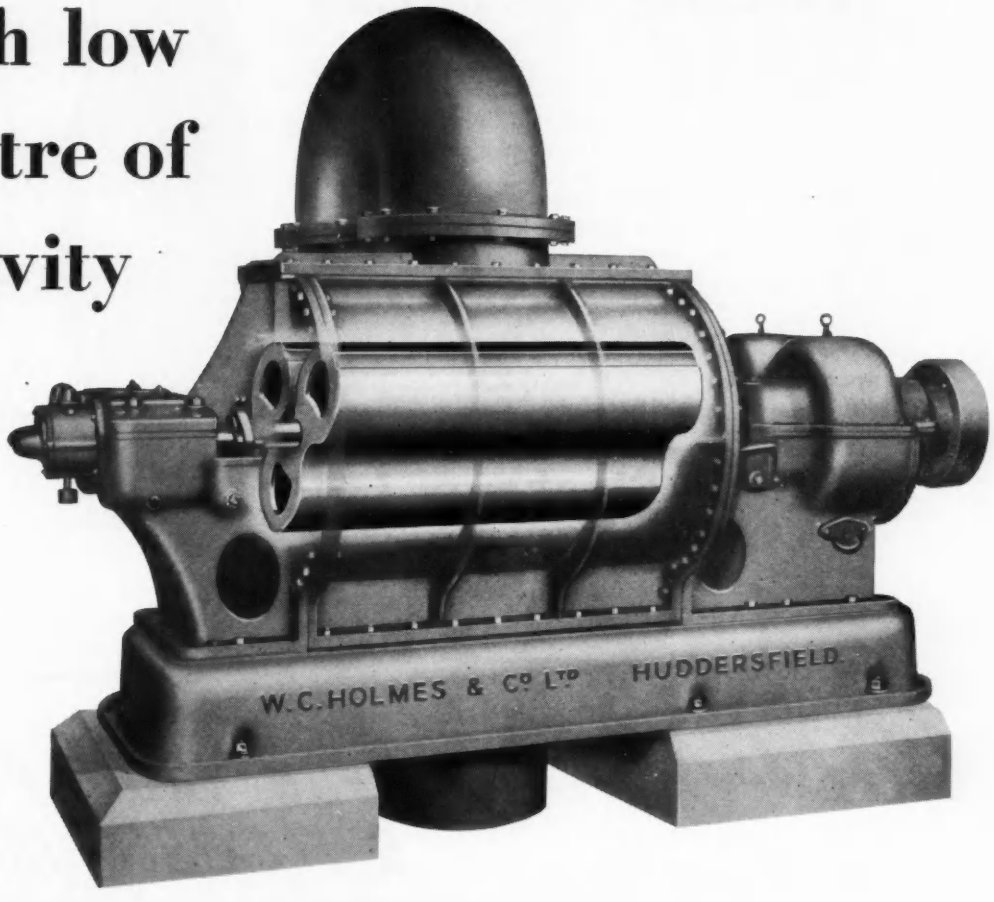
KINGS PATENT AGENCY, LTD
(Director, B. T. King, A.I.M.E., Patent Agent) Advice, Handbook, and Consultations free. 146a, Queen Victoria Street, London, E.C.4. 'Phone: City 6161.

The
LIMIT OF EFFICIENCY CAN BE REACHED
by the use of
LUX
GAS PURIFYING MATERIAL
Sole Importers:
HARRISONS (London) LIMITED
66, Mark Lane, LONDON, E.C.3
Telegrams: Birchrock, London Telephone: ROYal 3128

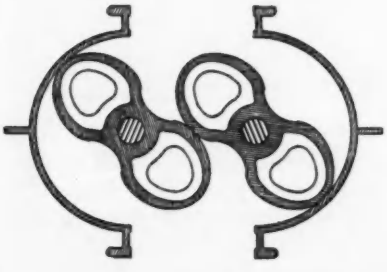

Lead...
SHEETING, WATER, WASTE
GAS AND SOIL PIPES
TO CUSTOMERS' REQUIREMENTS. MANUFACTURERS OF EMBOSSED LEAD PIPE, AS SUPPLIED TO GAS BOARDS
by R. E. ROBERTS

MAXIMUM STABILITY

with low centre of gravity



maximum stability



and efficiency are assured in the re-designed Holmes-Connersville exhauster. The upward gas delivery results in the downward thrust being carried the shortest distance to the bedplate. The gas inlet is conveniently arranged under the machine with outlet on top permitting easy internal inspection.

HOLMES-CONNERSVILLE EXHAUSTERS AND BOOSTERS

W. C. HOLMES & CO. LTD., HUDDERSFIELD

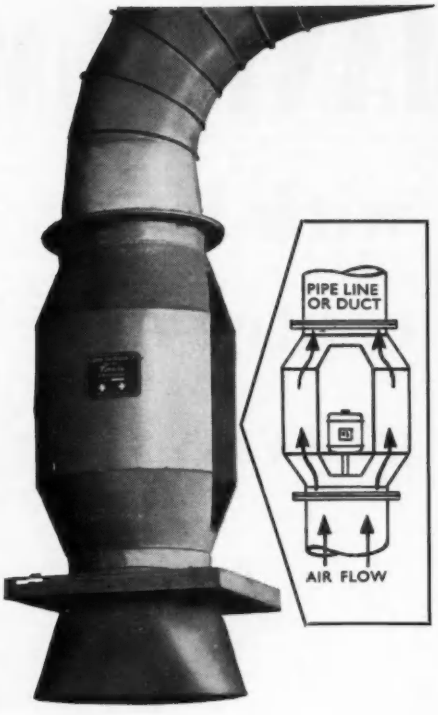
Tel: Huddersfield 5280 London: Victoria 9971 Birmingham: Midland 6830

C 2179

the reasons why Bifurcated Fans are used for extracting Fumes and Gases

from FUME CUPBOARDS · DE-GREASING, DE-SCALING and DE-OXYDISATION BATHS · PICKLING and NEUTRALISING TANKS IMPREGNATING TANKS · PAINT SPRAY BOOTHS FURNACES and FORGE PRESSES · CONFECTIONERY and BAKING OVENS

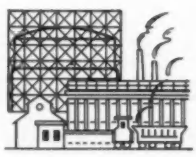
BECAUSE within the operational range of these units no other fan compares for price, design simplicity and economy of space. Bifurcated fans are direct driven units which will handle obnoxious fumes and gases up to 350° F. Their easily accessible K.B. made, totally enclosed and weatherproof motors are completely isolated from the fumes or gases handled.
Ranging up to 25″ diameter, the sizes are matched to commonly used pipes and ducts. 10″, 12″, 14″, 16″ and 19″ fans are held in stock. If you want full details of this exclusive fan type write now for Publication No. 28/7



Keith Blackman Ltd
MILL MEAD ROAD, LONDON, N.17
Fan Makers to the Chemical Industry

T.A.7164/605

Cochranes SPUN IRON PIPES & FLEXIBLE JOINTS



Screwed-Gland Flexible Joints: up to 10″ diameter
Bolted-Gland Flexible Joints: 12″ and above

Cochranes (Middlesbro') Foundry Limited, Middlesbrough

Registered as a Newspaper. Printed by STRAKER BROTHERS LTD., E.C.2 for WALTER KING LIMITED, 11, BOLT COURT, FLEET ST., LONDON, E.C.4, Wednesday, December 15. 1954

SYSTEMS

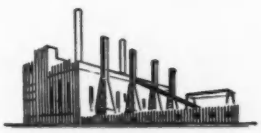
one aim . . .

GLOVER – WEST

CONTINUOUS VERTICAL RETORTS . . . . . .

C.O.L

INTERMITTENT VERTICAL CHAMBERS . . . .



. . . efficient carbonization

WEST'S

GAS IMPROVEMENT CO. LTD

ALBION IRONWORKS · MILES PLATTING · MANCHESTER 10

Telephone: COLlyhurst 2961 Telegrams: Stoker, Manchester

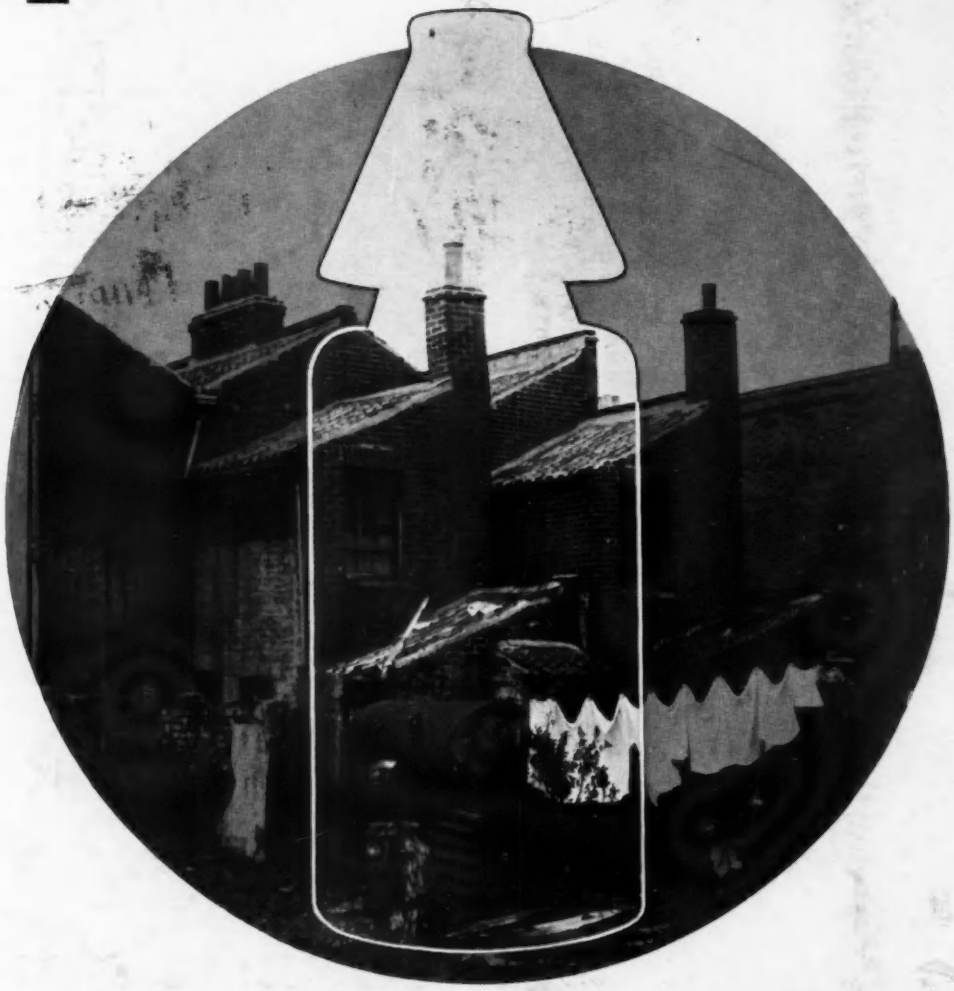
AND IN LONDON:

Columbia House, Aldwych, W.C.2 Tel: HOLborn 4108 Grams: Wesgasco, Estrand

C.O.L. Division: Chandos House, Buckingham Gate, S.W.1 Tel: ABBey 6912

GC1

Operation Rescue



and ASCOT

Since one of the important objectives of Operation Rescue is the provision of a hot water supply, the merits of the Ascot system will come under review when plans for improvement or conversion are considered.

It will be found in many cases that the most economical and efficient method of providing hot water will be an Ascot — a multipoint, a bath water heater, or a sink water heater, or perhaps a combination of the last two.

Ascot heaters are, for the service they give, inexpensive to buy. Often they are cheaper to install than some other popular systems because the pipe runs are simple.

They do not burn raw coal, which is in the interests of the householder, his neighbours, and the whole nation.

Because they heat only the water actually required Ascots are economical in use.

Finally, and really most important, they give the householder a first-class hot water service from which he and his family can get piping hot water instantly day or night in an endless flow. Only of an instantaneous gas water heater can it be said that

ASCOT

It never runs cold

The Ascot Technical Department offers full co-operation, and invites inquiries

ASCOT GAS WATER HEATERS LIMITED · 255 NORTH CIRCULAR ROAD · LONDON · NW10

WHG/A.101